A professional development framework for technology integration

A dissertation submitted by

Thomas L Otto
Dip.Teach.(Prim.), Grad.Dip.Ed.Admin.,
Grad.Dip.Ed.(Exceptional Chn.), B.Ed., M.Ed., Ed.D.

For the award of
Master of Philosophy

Faculty of Education
University of Southern Queensland

2008

Abstract

A professional development framework emerged in a project to support teachers and school administrators in the classroom implementation of ePortfolios. The framework is a checklist of questions to guide the design, evaluation, and sustaining of a constructivist learning environment. Activities include an investigation of the issue and context, access to a library of cases and information resources, skill development in the use of tools, and social and contextual support (Jonassen, 1999). Case-Based Reasoning is a key feature as participants access cases to complement their own experience. The professional development framework was refined in a project that sought to improve the success for boys. The researcher applies his inside knowledge as a school principal and utilizes local expertise and resources.

Certification of Dissertation

I certify that the ideas, analyses and conclusions reported in this dissertation are entirely my own effort, except where otherwise acknowledged. I also certify that the work is original and has not been previously submitted for any other award, except where otherwise acknowledged.

Signature of Candidate	Date

Endorsement

Signature of Supervisor	Date
Signature of Associate Supervisor	Date

Acknowledgements

Sincere thanks to my supervisor, Associate Professor Peter Albion. Besides providing timely advice, Peter helped make the journey to be meaningful and worthwhile. He encouraged me to publish my work in a book chapter, to be involved in the delivery of relevant tertiary courses, and to serve on the editorial board of the AACE journals. Peter's contacts and networking skills opened a new world of sharing and learning. This is the second doctoral dissertation that Peter has supervised for me, and I have enjoyed our conversations over the past eleven years.

I would also like to thank my associate supervisor, Dr Shirley Reushle, and Dr Henriette van Rensburg for reading the final drafts. I acknowledge and thank the Dean and members of the Faculty of Education, University of Southern Queensland for their encouragement.

I acknowledge and thank the many participants involved in the professional development projects reported in this study. The enthusiasm and commitment of these teachers and school administrators was energising, and their willingness to learn, experiment, and share their perceptions and achievements is evident throughout the dissertation.

I thank my wife, Joanne, for her patience, understanding, and support throughout the project. Thanks also to our parents and to our children, Ben, Elizabeth, Daniel, David, and Rebecca, who each contributed in their own way.

Dedication

In memory of my son
Andrew Thomas Otto,
who was a gentle man with courage and compassion.
Fly little Hawk.

Table of Contents

List of Figures

List of Tables

Chapter 1: Background to the Research Problem

Computers, digital cameras, printers, data projectors, the Internet, email, and Microsoft Word are common place in homes, and Global Positioning Systems (GPS) are a popular accessory in motor vehicles. Mass production and market competition has reduced the price of these technologies to fall within the budgets of the average family home, e.g., the Australian Bureau of Statistics (2008) reports that household ownership of computers has increased from 29% in 1998 to 73% in 2006-07. During the same period household access to the Internet has increased from 16% to 64%. The Queensland School Technologies Director says "most students have been immersed in technology since birth and are adept at using it, even before they start school" (Education Views, 2008, p. 16). Governments recognise that schools need access to the new technologies. The Queensland School Technologies Director goes on to say "computers are an integral tool of the trade for teachers. They help to engage with students and connect on a local, national and global level with other students and teaching professionals" (Education Views, 2008, p.16). Queensland schools are networked and teachers and students have access to the Internet, email, and data storage, and receive an annual Information and Communication Technology (ICT) grant. The Queensland Department of Education, Training and the Arts (DETA) maintains an online service for students and teachers called *The Learning Place*, which provides an access point for teaching resources and allows classroom teachers to set up online courses and project rooms for their students. Investment in these resources is on a large scale, e.g., the Queensland government has undertaken a $A70 million project over three years to provide all teachers with a laptop. The size of this project can be appreciated when it is reported that 13 400 laptops have already been disbursed, representing a little more than a quarter of the state's teachers (Education Views, 2008).

Such a large investment in technology and expectations about the impact of technology on teaching and learning requires assurances that technology is used effectively in the classroom (Guskey, 2000). Issues relating to the effective use of technology in schools concern the provision of resources and infrastructure, equitable student access, and the preparation of future teachers in teaching with technology (Lawless & Pellegrino, 2007). However, it is the issue of "retraining the current teaching workforce in the use of technology-based instructional tactics," (Lawless & Pellegrino, 2007, p. 576) that is of particular interest to this study.

Retraining teachers is problematic in a number of ways. First, the range of technologies that can be used in the classroom may be overwhelming. Second, technology can be integrated in various ways, some more efficiently and effectively than others (Lawless & Pellegrino, 2007). Therefore, it cannot be assumed that just because a teacher is using technology, student outcomes are being enhanced. Third, only the youngest of teachers would "have been immersed in technology since birth and [be] adept at using it" (Education Views, 2008, p. 16). Issues with integration can be addressed only if teachers are skilled and confident in using technology and their knowledge of what can be achieved with technology has been developed. Ropp (1998) says "for some teachers, the gap between their perceived technology competence and learning to use computers in their teaching is often threatening and overwhelming" (p. 894). These are only a few of the problems associated with professional development for technology integration, and further issues will be described in this chapter.

1.1 Professional Development for Technology Integration

The Technology in Schools Taskforce (2003) provides the following definitions. *Professional development for technology integration* refers to "learning activities of all kinds for school staff that prepare them to use technology in the school setting" (chap. 6, para. 6). This type of professional development "is an ongoing process that cannot be satisfied with one-time training in a particular technology" (chap. 6, para. 7), and activities may include:

1. familiarization with the operation of equipment and software;
2. development of proficiency in the use of the technology 'tools' to carry out school tasks;

3. the application of software and applications for the management of school activities, whether instructional or administrative; and
4. the integration of technology into teaching, learning, and administrative processes (chap. 6, para. 6).

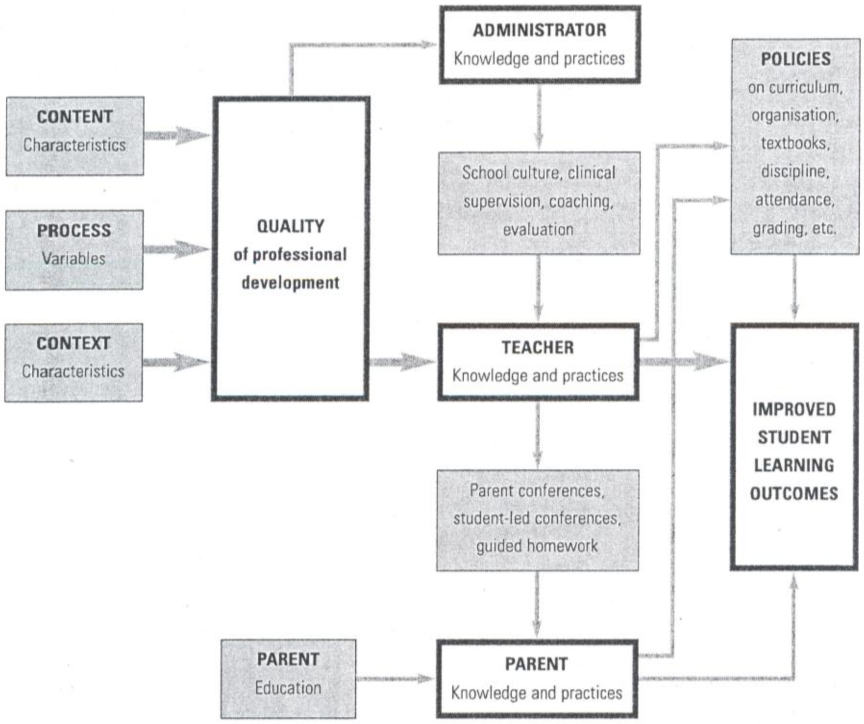
School staff includes administrators, teachers, and administrative and support staff. *Technology integration* describes the use of ICTs and other technologies to support teaching and learning and is defined as “the incorporation of technology resources and technology-based practices into the daily routines, work, and management of schools” (chap. 7, para. 3). The resources that are used in technology integration include “computers and specialized software, network-based communication systems, and other equipment and infrastructure” (chap. 7, para. 3). Teaching practices associated with technology integration “include collaborative work and communication, Internet-based research, remote access to instrumentation, network-based transmission and retrieval of data, and other methods” (chap. 7, para. 3).

While one aspect of professional development for technology integration is to familiarize teachers with technology, according to a report commissioned by the Department of Education, Science, and Training (DEST) (2001), the primary goal is to support a “change process that deals with the full range of impediments to and facilitators of student and teacher learning” (p. 19) Lawless and Pellegrino (2007) agree:

> Technology is often poorly integrated with other classroom instructional activities. Word processing and basic-skills practice are the most frequent uses of computers in instruction, whereas the use of applications that engage analytical thinking and problem solving through simulations and other media is relatively infrequent (p. 580).

Lawless and Pellegrino (2007) cite a number of studies which support the position that there is a relationship between professional development and student achievement, including Darling-Hammond (1999); National Commission on Teaching and America’s Future (1996); National Education Goals Panel (2000); Wenglinski (2000); Corcoran, Shields, and Zucker (1998); Loucks-Horsley, Stiles, and Hewson (1996); National Foundation for the Improvement of Education [NFIE] (1996); National Staff Development Council (2001); Porter, Garet, Desimone, Yoon, and Birman (2000). The DEST (2001) report suggests that “while the relationship of Professional Development to student learning is complex, it is not random or chaotic” (p. 20). There are factors within a professional development program that can be isolated and their influence identified. The model in Figure 1.1 demonstrates one view of this process, and highlights the need for professional development (a) to consider the variables of content, process, and context; (b) to be systemic, i.e., to include the whole school; and (c) to focus on improving student learning outcomes (Guskey, 2000).

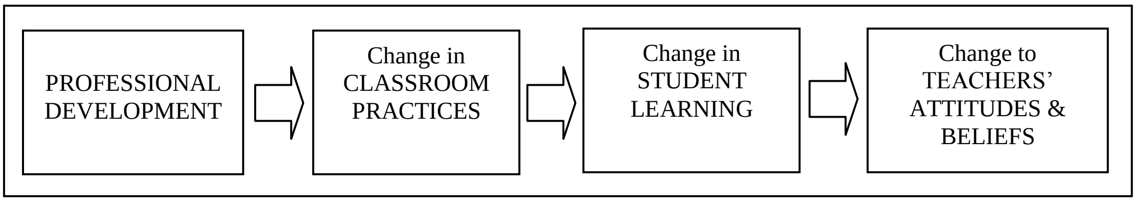
Figure 1.1: Relationship between Professional Development and Improvements in Student Learning



(Guskey, 2000, p. 73)

The model of teacher change in Figure 1.2 goes one step further. This model suggests that if teachers participate in quality professional development and change their teaching practices, they will observe changes in student learning which in turn will change their attitudes and beliefs about teaching (Guskey, 2000).

Figure 1.2: A Model of Teacher Change



(Guskey, 2000, p. 139)

Each of the elements within Figure 1.2 raises issues that will be discussed in this chapter. That is, what constitutes quality professional development, what is exemplary classroom practice using technology and how is it measured, what are enhanced student outcomes and how are they measured, and how can teachers' attitudes, beliefs, and practices be changed?

1.2 Issue #1: What Constitutes Quality Professional Development?

Guskey (2000) notes in Figure 1.1 that it is not just professional development but the quality of professional development that contributes to teacher knowledge and practice and improved student learning outcomes. The design and facilitation of quality professional development for technology integration is a complex issue with multiple factors to be considered and addressed. Three principal references contribute to an investigation of this issue. First, a literature review undertaken by Lawless and Pellegrino (2007) summarizes what is known and not known about professional development for technology integration. Lawless and Pellegrino (2007) conclude "there are many principles offered, but the existing empirical evidence to support them is generally weak" (p. 577). Second, Williams (2005) presents a commissioned report on the models of professional development applied in projects in 2004 and 2005 funded by the

Australian Government Quality Teacher Programme, with a focus on action learning. The pre-conditions for success and barriers to successful professional development listed by Williams (2005) demonstrate the complexity of the issue (see section 1.2.5). Williams (2005) concludes that while action learning is a simple concept it is difficult to sustain. Third, DEST (2001) funded a report (a) to measure the effectiveness of professional development for technology integration in terms of student and teacher outcomes; (b) to identify the various models applied; and (c) to list barriers and factors contributing to success. This report reaches the same conclusion that "teacher development is a complex matter" (p. 3). The report suggests:

> There is much evidence that traditional forms of professional development are not really effective in creating improvements in student learning . . . [and] the very nature of the teaching profession as being practice 'behind closed doors' mitigates against moves to school-based collaborative teacher development (p. 3).

Professional development for technology integration therefore involves more than designing efficient programs for teachers to access information and improve their skills. Teacher resistance has to be addressed and teachers need to agree to be active participants (Williams, 2005). Cuban (1993) notes the "paradox of teachers being both the problem and the solution" (p. 274) and highlights the importance of teachers being central to any process of change. This is particularly relevant when the type of professional development required is "grounded in inquiry, reflection, and experimentation" (DEST, 2001, p. 19), which can only be achieved if teachers take responsibility for exploring the solutions to the problems in their domain. This type of professional development can be characterised as "participant-driven" (DEST, 2001, p. 19). Governments and central education authorities may coerce teachers to participate in professional development by applying "incentives and sanctions" (Cuban, 1993, p. 274), but this approach will never reach the level of commitment of teachers who are motivated to participate by their own recognition of the potential of technology.

1.2.1 Sustained and Rigorous with On-going Support

Quality professional development programs are sustained over an extended period of time (DEST, 2001). It takes time for teachers to become familiar with the technology they intend to use in the classroom. While reference to written guides may be a useful tool during the development of skills and knowledge, the aim must always be to develop teachers' confidence so they can independently solve problems. Confidence can only be achieved with practice over time and in meaningful ways (Lawless & Pellegrino, 2007). A new set of issues arises when the teacher introduces the technology in the classroom. The teacher will need to simultaneously manage student behaviour, activity, and access to the technology, work to a curriculum, set up and manage not just their own computer but a room full of computers, and demonstrate their own perhaps limited technology skills. This period of experimentation will need to take place before the teacher can begin to consider the effectiveness of teaching practices and reflect on how those practices may be improved (King & Newman, 2001). The on-going support and follow up processes in a professional development program during this classroom implementation process is critical (Williams, 2005).

Besides being sustained, professional development programs need to be rigorous and intensive (DEST, 2001). Working on a particular application once a week, for example, will never achieve the level of familiarity and competence that is required by a teacher who intends to use that application in the classroom. Quality professional development programs therefore require well established infrastructures "to promote and sustain teacher learning and instructional improvement over the long term in order to generate organisational changes and sustain teacher change" (DEST, 2001, p. 19). This is not always easy to achieve, and there are many reasons for failure either real or perceived. Teachers and mentors change schools, they lose interest, they are busy people and have other priorities, it all becomes too difficult and unmanageable, they may not have the resources to make the changes they want to make, and early failures and a lack of confidence may build resistance.

Time does not just refer to the hours that teachers need to learn new skills, but also the time for "inquiry, reflections, and mentoring" (DEST, 2001, p. 19) that is part of the implementation process. This may require “rethinking the work and working conditions of teachers, and their professional roles and responsibilities” (DEST, 2001, p. 19). For example, funds may be needed to pay for the teacher to be released from their normal classroom duties.

A sustained professional development program that provides teachers with feedback and support (King & Newman, 2001) demands a committed team that has a skilled manager and shared goals (Alexander & McKenzie, 1998). The teachers will also need access to the required hardware and software and on-going technical support (Alexander & McKenzie, 1998). The type of support and feedback that is most useful “integrates theory, models practice in situ and encourages teachers to move out of their comfort zones or improves the level of sophistication in thinking” (Williams, 2005, p. 40). These elements of a quality professional development program may cost money beyond the capacity of an individual school to provide (Alexander & McKenzie, 1998).

1.2.2 Promotes Collaboration

Quality professional development should “promote peer collaboration and community building” (Lawless & Pellegrino, 2007, p. 579), “both within and outside their schools” (King & Newman, 2001, p. 86). Collaboration and conversation needs to occur at a deep level, and there are a number of ways this can be achieved. Teachers may “host professional conversations, pose questions, mentor peers and participate in professional exchanges using protocols and similar activities” (Williams, 2005, p. 14). These strategies facilitate the sharing of knowledge (DEST, 2001). As well, “groups can solve more interesting and complex problems than an individual working alone. [Learners] working in groups need to articulate designs, critiques, and arguments to other group members, encouraging the kind of reflection that leads to learning” (Guzdial et al., 1996, p. 43). Collaboration needs to be both synchronous to support planning and brainstorming and asynchronous to support reflection and sharing of achievements and knowledge. Another important aspect of collaboration is the review of student work, which can generate high levels of professional dialogue and deprivatise practice (Williams, 2005). The “teacher talk” generated when discussing students’ work may be a starting point for more open discussions about individual practices.

1.2.3 Meets Teacher Needs in a Specific Context

Quality professional development programs allow teachers to influence the content and process of the program so that it meets their particular needs (King & Newman, 2001). The program designer, leader, and facilitators need to understand teachers as learners and the generic and specific context in which they work, and incorporate a mechanism to respond to teacher sensitivities, feedback, and requests. “Modelling new ‘pedagogies’ in non-specific and decontextualised ways has been demonstrated not to work” (DEST, 2001, p. 20). A context specific program contributes to the meaningfulness and relevance of activities so that teachers can more easily translate new learning into change (Lawless & Pellegrino, 2007). Furthermore, theoretical understanding and skills can be “connected to and derived from teachers’ work with their students” (DEST, 2001, p. 20).

Phelps, Graham, and Kerr (2004) say:

> Learning to use computers involves learning to adapt to change, to be flexible, intuitive and above all persistent, and learners who know how to be self directed and independent will be more successful than those dependent on structured routines or guidelines (p. 51).

While developing teacher skills may be an objective, this must be balanced with a need to focus “on teachers’ approaches to learning, their beliefs, attitudes and metacognitive understandings” (Phelps et al., 2004, p. 51). In order to sustain their learning and experimentation, teachers need to develop as confident and empowered learners to “come to terms with the nature of technological change and their own abilities to confront this change” (Phelps et al., 2004, p. 51). A self-directed teacher will be able to identify what it is that they need to learn and take a more active role during the learning process. For example, they will take the initiative to seek support from colleagues, support personnel, or students in their class (Phelps et al., 2004). A self-directed teacher will also be reflective about their everyday practices, a necessary step in improvement (Esson, Johnson, & Vinson, 2002). Professional development programs therefore need to increase in sophistication from the development of skills to intellectual development and teacher leadership (DEST, 2001). At the same time, though, the anticipated outcomes of a program need to be realistic and within the scope of the facilitators to deliver and within the capacity of the teacher to achieve (Alexander & McKenzie, 1998).

Knowledge about teachers as learners will influence “the nature of engagement” (Williams, 2005, p. 40). For example, if teachers are to be encouraged to take an active role in their learning, it will not be sufficient for them to create a lesson plan as an exemplar, unless that plan is implemented and becomes the focus of peer reflection (Heath, 2000, p. 653). This extension to the activity is not simple because it involves the deprivatising of practice and therefore requires the willingness of the teacher to participate. Supporting peers by reflecting with them about a lesson demands sensitivity and respect, and a mutual feeling of contributing to a life long learning journey (Williams, 2005).

A one-shot workshop is a common engagement strategy that is useful for demonstrating equipment and software. Though helpful for some people (Heath, 2000), Lawless and Pellegrino (2007) conclude this type of activity is too fragmented and disconnected from classroom activity to be particularly useful in technology integration. More effective programs “are spread out over time with opportunities for follow-up learning and feedback” (Lawless & Pellegrino, 2007, p. 594). There is also a risk of “information overload” (Heath, 2000, p. 654) in a brief workshop or disengaging participants in a long or boring workshop.

Lawless and Pellegrino (2007) believe a coaching model can support teachers through a period of change, with benefits for both the mentors and mentees. This type of activity depends on the development of personal relationships, which may not suit everyone, and one-on-one coaching may not be efficient in bringing about widespread change. In the train-the-trainer model, teachers are trained and then return to their schools or districts to train other teachers. A trained teacher as a facilitator may be more credible to their peers and understand the context in which teachers function (Lawless & Pellegrino, 2007). These are some of the strategies available to program designers, each with advantages and disadvantages.

A variable characteristic of teachers as learners is the basis for their participation, e.g., as volunteers in their own time, as a school, district, or systemic expectation undertaken in their own time, or as an expectation taken in paid time. Lawless and Pellegrino (2007) conclude that volunteers and non-volunteers have different needs and differ “in terms of their motivation to learn, their commitment to change, and their willingness to be risk takers” (p. 580). A professional development program that is successful with volunteers as participants may be not as successful for non-volunteers.

1.2.4 Supported by Supervisors

Quality professional development programs are supported by supervisors, and the achievements of the teachers are recognised by the education system (Alexander & McKenzie, 1998). Supervisors and the education system provide authority to the project that contributes to a positive school culture, rewards risk takers, injects support when the new practice becomes difficult, and respects and values the work that the teachers are doing (Williams, 2005). There are many practical ways in which districts can actively support a professional development program, such as:

1. run awareness-raising programs;
2. inject new ideas into school environments, so that messages [are] reliably and clearly conveyed (not second hand) and teachers have access to ideas from outside of their everyday sphere of influence;
3. host action learning leaders programs;
4. co-manage some action learning projects with schools;
5. assist in the evaluation and review of action learning;
6. give authority to action learning, [and] include such strategies in District-level Learning and Development Frameworks and school plans;

7. promote a positive culture for professional learning amongst schools; and
8. design and facilitate celebration events and provide audiences for teacher learning (Williams, 2005, pp. 15-16).

1.2.5 Multiplicity of Effects

The elements and variables in a quality professional development program are extensive. Williams (2005) demonstrates the multiplicity of effects in Table 1.1 which lists the preconditions and barriers contributing to the success or failure of action learning in a school setting. The learning sets referred to in the table are groups of teachers who are working together on a learning project.

Table 1.1: Preconditions for Success and Barriers

Preconditions For Success	Barriers
Structure	
1. Following through on the whole cycle; 2. Project leadership; 3. Strong project designs; 4. Public celebration as an end point; 5. Subject matter; 6. Effective set meetings; and 7. Celebration of learning.	1. Keeping learning sets meeting; 2. Failing to stick at it and complete cycles; 3. Helping others understand the pedagogy of action learning & adult learning; 4. Sticking to Learning Set protocols; 5. Documentation processes - needing to make and record observation; and 6. Actually doing projects amidst growing behaviour management problems.
Settings	
1. Student focus – student learning as a buy in; 2. Staff with necessary subject matter expertise; 3. Group support; 4. Administration team support; 5. Budget for resources; and 6. Time.	1. Facilitators needing more skills; 2. Teachers need communication skills; 3. Not enough support; 4. Time when other priorities surface; 5. Time as a leader to make it happen; 6. Lack of finances or resources; 7. Outside influences other people impose; and 8. Changeover of staff.
Attitude	
1. Independence to choose focus; 2. Teacher interest; 3. Willingness to ask questions, be questioned and change practice; 4. Teachers willing to take responsibility for their learning; 5. Relationships in teams and common ground; 6. Culture of the school - supportive risk taking and supporting innovation; 7. Teacher planning processes akin to action learning; and 8. Getting positive buy in from peers.	1. Blockers and negativity; 2. Teachers not taking responsibility for their learning; 3. Teacher readiness to participate in the process; 4. People don't want to share; 5. People want to be told prescriptive solutions; 6. School culture is negative; 7. School culture is too active, too many new things every year add too much professional development; and 8. Giving teachers confidence to share is difficult.

(Williams, 2005, pp. 53-55)

As previously discussed, technology integration as the topic for professional development compounds the complexity of the issues involved. Quality programs need to be well designed, managed by a committed leader and support team, have the support of districts and the education system, attract funding, meet the needs of teachers and students, and be sustained and rigorous. Measuring the impact of a professional development program in terms of changes to teaching practices and enhanced student outcomes introduces a new set of problems and is the topic of Issue #2.

1.3 Issue #2: Changing Teaching Practices and Improving Student Learning

Quality professional development programs for technology integration measure outcomes in terms of the gains in teacher knowledge and skills, the changes they have adopted in practice, and the impact of those changes on student achievement (Guskey, 2000). Therefore the intended outcomes of a program need to be articulated and documented, and evaluation strategies designed and implemented (Lawless & Pellegrino, 2007). From their investigation, Lawless and Pellegrino (2007) conclude "this has not been the case with the majority of professional development evaluations reported in the literature” (p. 580). Again, the nature of teaching and the complexities of professional development for technology integration create issues that make the measure of outcomes problematic, as discussed later in the chapter.

1.3.1 Exemplary Teaching with Technology

Part of the difficulty in designing and evaluating a professional development program is the need to define what is meant by exemplary pedagogy that integrates technology (Ertmer, Gopalakrishnan, & Ross, 2000). Gage (1985) defines pedagogy as the science of the art of teaching. In describing what a teacher does as an art, Gage (1978) uses terms such as “intuition, creativity, improvisation and expressiveness” (p. 15). Effective and reflective teachers are similar to artists because they are not bound by strictly laid down rules or processes (Gage, 1978), and adjust their repertoire in the midst of action (Schmidt, 2000). Similarly, the integration of technology “for many teachers . . . is something they tackle ‘on the run’ - making it up as they go along, grabbing ideas where they can find them” (Lankshear, Snyder, & Green, 2000, p. 23). Good teaching, with or without technology, is about:

> Knowing when and how to intervene to encourage pupil autonomy and contributions that influence the quality of the learning experience for both child and teacher. Knowing when to stand back in order to allow children time to work through uncertainty to solutions; knowing when to provide new information or skills to equip the children in their task; knowing when to ask a question to challenge or divert; knowing how to balance guidance and sharing of expertise with providing opportunities for children to think and work things out for themselves - such knowledge implies ‘intelligent action’ on behalf of the teacher. It is this intelligent action that lies at the heart of effective teaching skills, and which reflective teachers develop throughout their teaching careers (Loveless, 1995, pp. 150-151).

The difficulty in defining and measuring exemplary pedagogy that integrates technology can therefore be attributed to the intuitive and creative nature of teaching. Interactions with children are unpredictable and the teacher is continually adjusting and responding to the context. This “intelligent action” (Loveless, 1995, p. 151) by teachers creates innumerable variables.

1.3.1.1 Definition of knowledge

Technology facilitates different teaching approaches, “shifting the management and control of the activity to the children and computer, [and] varying the nature of the interventions according to the technical experience and cognitive needs of the children” (Loveless, 1995, pp. 150-151). Teachers using technology in the classroom may take on different roles other than the traditional didactic instructor, including that of “demonstrator, project manager, consultant, resource provider, questioner, explicator, observer, model learner and co-learner” (Loveless, DeVoogd, & Bohlin, 2001, p. 68).

To investigate why technology can facilitate different teaching approaches it is necessary to understand opposing definitions of knowledge at the foundation of “two approaches to teaching that represent different and somewhat incompatible models of good pedagogy” (Ravitz, Becker, & Wong, 2000, p. 3). In the first approach to teaching, knowledge is perceived as a “static, impersonal and unchanging entity” (Loveless et al., 2001, p. 74) that exists independent of a learner. A teacher holding this view is likely to perceive the purpose of teaching as helping children understand and retain “fundamental truths” (Tucker & Batchelder, 2000, p. 2467). Approaches to teaching associated with this view are the traditional transmission instruction theories of learning that suggest children learn most effectively by answering questions relating to teacher or text explanations, and children develop skills by practising sequential skills (Ravitz et al., 2000).

In the second approach to teaching, Tucker and Batchelder (2000) explain that knowledge is perceived as being constructed by learners and existing within learners, growing and changing as new understandings develop from prior knowledge. According to the constructivist perspective, learning is less concerned about “facts, concepts, or laws waiting to be discovered” (p. 2467) and more concerned with “an understanding of causes and effects” (p. 2467). A teacher holding a view that is compatible with the constructivist perspective is likely to perceive learning as an "active rather than passive" (p. 2469) process requiring "higher order or critical thinking skills" (p. 2467). Approaches to teaching associated with this view suggest children develop new understanding by relating new ideas to prior understanding and develop new skills as required while solving concrete problems. Brooks and Brooks (1999) are mindful that "constructivism is not a theory about teaching, but is a theory of learning that describes the central role that learners' ever-transforming mental schemes play in their cognitive growth" (p. 18). It is the principles that emanate from the constructivist perspective that informs educational practice. Cunningham (1992) summarizes the constructivist perspective by saying "there is so much knowledge in the world it would be impossible to teach them everything, in any event. What we are after is showing [learners] how to construct plausible interpretations of their own, using the tools that we have provided" (p. 41).

1.3.1.2 Traditional and constructivist-compatible approaches to teaching

Besides differing in perceptions of knowledge and ways to manage knowledge, traditional and constructivist-compatible approaches to teaching differ in the roles of teachers and learners (Ravitz et al., 2000). In traditional approaches, teachers plan activities around subject content. Independent work, for example homework, also reflects subject content and is designed to be efficient and to be completed with minimum errors. That is, children work through exercises to practise concepts taught by direct instruction. Approaches to teaching associated with constructivist-compatible theories of learning base content on children's "interests, prior experiences, and current understandings" (Ravitz et al., 2000, p. 4), and these will vary from child to child. The teacher facilitates child directed effort, and mistakes, rather than being an indicator of a lack of understanding, are embraced as a motivator for engagement. Another difference lies in the "social structures for learning. Debates between students, cooperative group projects, and other activities involving the articulation of students' own ideas in concrete contexts are valued by constructivists" (Ravitz et al., 2000, p. 4). Becker (1998) illustrates these fundamental differences in Table 1.2.

Table 1.2: Philosophy Index

Constructivist Philosophy	Traditional Philosophy
1. Knowledge is built through class and group discussions;	1. Teachers describe and explain concepts, and students learn this content;
2. Students need to find answers to their own questions and problems;	2. A quiet classroom is important for learning;
3. Students construct concepts for themselves;	3. Acquiring basic content knowledge and skill [is] primary;
4. "Sense-making" and guided inquiry;	4. Teacher - not students - determine activities;
5. Authentic, integrated tasks; and	5. Instruction is built around problems with clear, easily found, correct answers; and
6. Diverse classroom projects.	6. Teaching facts and skills provides the foundation for later learning.

(Becker, 1998, p. 17)

Jonassen and Land (2000) further explain that the traditional philosophy of instruction is based on the following premises:

1. Knowledge is transmitted from teachers (or technologies) to learners;
2. Instruction is based on a communications model of instruction;
3. Improving learning is a matter of more effectively communicating ideas to learners by improving the clarity of the message;
4. Teaching is a process of conveying ideas to students; and
5. Knowledge is an object that can be conveyed and owned by individuals, which assumes the student can come to know the world as the teacher does . . . [and] that students want to know the world as the teacher does (pp. iii-iv).

This approach "relies on the submission model of learning as well as the transmissive model of instruction" (p. iv). On the other hand, teaching practices associated with a constructivist philosophy include:

1. designing activities around teacher and student interests rather than in response to an externally mandated curriculum;

2. having students engage in collaborative group projects in which skills are taught and practised in authentic contexts rather than in a sequence of textbook exercises;
3. focusing instruction on students' understanding of complex ideas rather than on definitions and facts;
4. teaching students to self-consciously assess their own understanding, in contrast to multi-choice testing; and
5. modelling learning, rather than presenting oneself as fully knowledgeable (Becker & Riel, 1999, p. 11).

Jonassen and Land (2000) believe learning from the constructivist perspective is "a process of meaning making" (p. v). They describe meaning making as "resolving the dissonance between what we know for sure and what we perceive or what we believe that others know" (p. vi). Dissonance is described as "puzzlement, perturbation, expectation violations, curiosity or cognitive dissonance" (p. vi), and engages learners and facilitates learners taking responsibility for their learning. The traditional philosophy "suggests that learners are often unable or unwilling to assume greater personal responsibility for learning, so learning should be externally mediated by instructional interventions" (Jonassen, 1991, p. 13). Constructivists, on the other hand, argue that unless meaning making is a central part of the learning process, learners may take on knowledge as a consequence of instructional interventions but will not take on the meaning of that knowledge (Jonassen, 1991). That is, the learner will not be able to judge where that piece of knowledge fits with other pieces of knowledge, and therefore that piece of knowledge will not contribute to any change in how we perceive the world and act within the world.

1.3.2 Reconciling Constructivist and Objectivist Methods

In an interview with Hunter (2000-2001), Luke voices a dilemma for teachers when he says "we as adults and participants in these cultures do know things that kids don't know that they need to know" (p. 138). That is, teachers who embrace child-centred learning and approaches to teaching associated with constructivist-compatible theories of learning, at the same time have a responsibility to ensure certain knowledge and skills are taught. This highlights the "intuition, creativity, improvisation and expressiveness" (Gage, 1978, p. 15) required in the art of teaching in order to achieve a balance between old practices and new practices, and applications using high levels of technology and applications using low levels of technology (Luke in Hunter, 2000-2001). Nevertheless, there is an opportunity to change historical perceptions of teachers as experts and instructors, and to realize the "*generational* potential for changed social relations, changes of power relations, [and] changes of pedagogical relations around new technologies" (Luke in Hunter, 2000-2001, p. 139). Luke attributes this potential to the Internet in opening up the access to knowledge and learning to a wider proportion of society.

Tucker and Batchelder (2000) propose another consideration:

> The reality of the situation is, teachers can find themselves in both the objectivist's camp and the constructivist's camp depending upon the objectives they are targeting. . . . The art of becoming a master teacher can be seen as an awareness of when to be in one camp or the other and an understanding of how to be effective no matter what camp one is in (p. 2468).

Phillips (1997) agrees that the approach taken by a teacher is influenced by the purpose of the lesson, and says "there is, in reality, no absolute instance of either theory [but rather] a continuum between objectivism and constructivism" (p. 21). Cunningham (1992) says that when the purpose of a lesson is to communicate knowledge "then it is reasonable to break the knowledge into its components and systematically present the material to the learner" (p. 41). However, if the purpose of the lesson is to provide the learner "with the means for constructing their own interpretation of that problem, then [the] task is to provide them with the tools for inquiring into it" (Cunningham, 1992, p. 41). Table 1.3 is a summary of Mayer's (1999) description of how knowledge construction can be fostered through direct instruction.

Table 1.3: Fostering Knowledge Construction through Direct Instruction

	Constructivist Principle	Values
1.	Focusing on process as well as product	Value in considering what is going on the learner's head rather than considering only what is presented.
2.	Enabling transfer as well as retention	Students should be able to use what they have learned rather than simply to be able to remember it.
3.	Promoting how to learn as well as what is learned	Values knowing how to learn (and think and remember) as well as what to learn (and think and remember).
	Cognitive Process	**Technique**
1.	Select Information	Highlight most important information, use instructional objectives, provide a summary, eliminate irrelevant information.
2.	Organize Information	Structure of the text, outlines, headings, pointer words, graphic presentations.
3.	Integrate Information	Advance organizers, illustrations with captions, animation with narration, worked out examples, elaborative questions.

(Mayer, 1999, p. 152-157)

Jonassen (1991) concludes that there are messages for teachers in both the objectivist and constructivist perspectives. In particular, teachers who understand the constructivist perspective will be encouraged to "look at the nature of the learning and the context in which it will occur" (p. 13), as well as how to "interpret the results of learning and how to design environments to support learning" (Jonassen, 1991, pp. 12-13).

1.3.3 Implications for Professional Development for Technology Integration

Ertmer et al. (2000) propose that although teachers may believe child-centered learning and constructivist-compatible practices are important, they may not implement those beliefs in practice. That is, "teachers adjust their constructivist practice to reflect real constraints and conflicting needs" (p. 28). Consequently there is a gap between what is philosophically regarded as exemplary teaching by teachers and the educational literature on the one hand, and teaching practices in classrooms on the other. From earlier discussions it is apparent that technology introduces a new range of constraints and needs, and that ultimately teachers will use technology in the classroom because they perceive benefits for their students. These arguments have implications for professional development programs for technology integration. What teachers say are their beliefs may not necessarily extend to what they do when teaching a class. That is, they may not have taken into account "real constraints and conflicting needs" (Ertmer et al., 2000, p. 28). Therefore evaluating the effectiveness of a program by measuring teachers' perceptions is not a guarantee there has been any change in teaching practices.

Ertmer et al. (2000) believe there is some indication that teachers who use technology in their classrooms may change their teaching strategies to be more aligned with approaches to teaching associated with constructivist-compatible theories of learning. That is, there is something inherent in the nature of working with technology that lends itself to teachers adopting child-centred approaches, and for learning to be more child-directed. Ertmer et al. (2000) note that other studies go so far as to define exemplary teaching with technology "in terms of the extent to which teachers' practices embrace a constructivist teaching philosophy" (p. 4). From their observations in the Apple Classrooms of Tomorrow (ACOT) project, Sandholtz and Ringstaff (1996) agree that technology may act as a catalyst in a gradual change in teaching behaviour. They attribute this change to conflict occurring between what a teacher experiences when using technology in the classroom and their beliefs, "prompting teachers to reexamine their beliefs about both teaching and learning" (p. 283). Teachers in the ACOT project were observed to be more learner-centred. They were less reliant on textbooks, children worked more collaboratively, and learning was more active than passive. Because some children were skilled and knowledgeable in the use of technology, the teacher was not perceived to be the only expert in the classroom, and the roles of those children were enhanced as they supported others. These arguments speculate on the effects of the use technology on teachers' beliefs and practices, while conversely, Ravitz et al. (2000) comment on the effects of teachers' beliefs and practices on the use of technology:

> Constructivist-oriented teachers use computers professionally in more varied ways, have greater technical expertise in the use of computers, use computers frequently with students, and use them in apparently more powerful ways. . . . teachers who engage in a

> constructivist pedagogy may actually be more likely as a result to seek out other teachers and become more professionally involved (p. 55).

Others, including Lawless and Pellegrino (2007), hold the view that technology will support both traditional and innovative practices:

> Technology can make it quicker or easier to teach the same things in routine ways, or it can make it possible to adopt new and arguably better approaches to instruction and/or change the content or context of learning. Decisions about when to use technology, what technology to use, and for what purposes cannot be made in isolation of theories and research on learning, instruction, and assessment (p. 581).

Lawless and Pellegrino (2007) argue it is not technology per se that initiates educational improvement, but the high-quality student learning that "comes about through coherent instruction and assessment" (p. 581). Cuttance (2001a) supports this view. After innovations in the use of technology had been implemented in classrooms during the Innovation and Best Practice Project (IBPP), teachers were observed to have changed their approach from "traditional 'chalk and talk' to student-focused learning" (p. xviii). He also attributed this change in approach to changes in teachers' beliefs about teaching and learning.

Conclusions that can be reached from these arguments are that ineffective teachers will continue to be ineffective despite access to new technologies, and conversely, effective or exemplary teachers, while not necessarily totally adopting a constructivist-compatible approach to teaching, will enhance their teaching by incorporating these new tools. A case study of three teachers by Pierson (2001) supports this position. Steve had high levels of skills in technology, but because of his unimaginative and teacher-centered approach to pedagogy he was "unable to link his technology expertise to his teaching" (p. 425). Jill was a creative and well organized teacher. Because she "perceived technology use as a practice distinct from her teaching practices, Jill essentially slipped back into novice teaching habits when teaching with technology" (p. 425). Technology was used "pervasively" (p. 426) in Sheila's classroom and there was little "distinction between the ways she viewed planning, management and assessment of technology use and her comparable strategies for more traditional learning activities" (p. 426).

Loveless et al. (2001) argue that "technology doesn't change practice - people do" (p. 63). Therefore teachers will be influenced in their approach to teaching by their beliefs about the purpose of schooling, the role of technology in education, and what constitutes effective use of technology in the classroom, as well as their understanding of the capabilities of technology and the cultural, social, and economic impacts of technology (Loveless et al., 2001). The continual evolution of technology in terms of its capabilities and impact will create new opportunities for integration, but will also further complicate professional development and its evaluation (Lawless & Pellegrino, 2007).

Regardless of whether teachers change their practice as a result of using technology or because they have made a conscious decision to approach teaching differently, quality professional development programs for technology integration need to consider teachers' goals for teaching, their beliefs about how children learn, their current approach to teaching, and alternate approaches to teaching. These fundamental and deeply engrained aspects of a teachers' daily function are difficult to influence as discussed in section 1.4.

Not withstanding any of the previous arguments, one of the key issues must be the choice of instructional design for professional development programs for technology integration. It would not be appropriate to instruct teachers in a didactic, traditional approach, if the goal of the program is for teachers to be more aligned with a constructivist-compatible approach in their integration of technology. To "teach the teachers as one would have them teach" must be a central axiom.

1.3.4 Student Outcomes

The issue of what constitutes exemplary teaching with technology extends to the issue of what constitutes exemplary student outcomes. Guskey and Sparks (1991) provide one definition:

> [Outcomes include] the entire range of cognitive and achievement variables, as well as affective and psychomotor indices of learning. Hence they might include measures of how well students learn, think, reason, and solve complex problems, as well as how they feel about themselves as learners or how they act as individuals (p.73).

Quality professional development programs will support teachers to develop a personal vision for student outcomes in consideration of the nature of technology and the future needs of children (Lawless & Pellegrino, 2007). The world is changing, and Conlon (2000) believes visions for education must be reconciled with those changes. For example, children should expect to change occupations and work with several companies, rather than work all of their lives for the same company doing the same job (Conlon, 2000). Their managers will offer them greater responsibility and empowerment than their parents experienced (Kerr, 1999), and value their ability to adapt to new situations and to develop new skills and practices (Conlon, 2000). Children will need to be self-motivated, self-directed, and able to access ongoing training and learning to be successful in a competitive job market (Grabe & Grabe, 1996; Conlon, 2000). They will need to know how to think and how to learn because learning information is now less important than the skills to access and manage information (Crane, 2000; Conlon, 2000).

In the context of a changing world, Conlon (2000) describes two visions for the purpose of education and the role of technology in learning. The first vision, paternalism, sees the purpose of education as preparing children to contribute to the national economy in a competitive international market place. People who hold this view argue that children should be taught about technology because technology skills are important in the new economy, and that children should be taught with technology because technology provides efficient tools for learning (Ross & Bailey, 1997). Children develop social cohesion by attending school, particularly if taught from a common curriculum. However, Conlon (2000) believes there are problems with this view. The technology skills children learn now will probably become redundant and at work they will follow instructions provided by their computer or become trained in specific tasks. A further problem is that unless the curriculum is appropriate for each community, the effect will be one of social alienation rather than social cohesion.

The second vision, libertarianism, sees the role of education as preparing children to be successful individuals in a new society (Conlon, 2000). People who hold this view argue that children should be taught about technology to empower them in a society and economy in which technology has a central role (Ross & Bailey, 1997). Children should be taught with ICTs because ICTs support a student-centred curriculum. A student-centred curriculum, as opposed to a common school curriculum, is seen as further contributing to the empowerment of children and their development as individuals (Conlon, 2000).

Goodson and Mangan (1996) provide an example of a view that is sceptical about the claims of an “inevitable future of marketplace automation” (p. 80). They believe such portrayals are “conditioning students to accept [technology] as part of their everyday lives . . . [and] to encourage acceptance of forms of technology and automation which benefit employers” (p. 80). Goodson and Mangan (1996) believe that teaching with computers “must be combined with meaningful human interaction in order to further the development of complete human beings” (p. 80).

1.3.5 Measuring Change

Besides the difficulty in defining appropriate outcomes for students, there is the difficulty of measuring those outcomes and in establishing a relationship with teacher professional development. For example, students learn from many sources and the influence of a particular aspect of professional development that led to a specific learning improvement would need to be isolated and identified. Establishing a relationship also depends on teachers maintaining changes in teaching practices and actually implementing the practices in the way intended by the professional development program. Lawless and Pellegrino (2007) conclude that despite the importance of understanding student outcomes, "no studies identified in the review of recent literature examined even the short-term effects that technology professional development has on student learning or its relationship to achievement" (p. 607).

Difficulties also arise in measuring change in teaching practices as a result of professional development. Lawless and Pellegrino (2007) say "measuring perceptions of the activities, technology integration, and teacher confidence with technology are still a common practice in the current literature on technology professional development" (p. 596). The measurement of perceptions provides some useful but limited information in terms of teacher stress levels, their confidence in using equipment, and whether teachers liked the activities (Lawless & Pellegrino, 2007). For example, measuring improvements in skills on self-report rating scales simply measures the confidence of the teacher in using the equipment and not necessarily their actual skill levels. Some techniques employed in studies include the collection and analysis of lesson plans, interviewing teachers, conducting focus groups, and collecting classroom projects. However, no information is provided on how students are integrating technology across the disciplines or their skills in using the technology (Lawless & Pellegrino, 2007). Therefore, "we end up rarely knowing what impact the professional development activity had on pedagogical change or student learning" (Lawless & Pellegrino, 2007, p. 579).

Case studies are able to provide information about the variables that need investigation, but "new and more innovative approaches to collecting evidence and measuring change are desperately needed" (Lawless & Pellegrino, 2007, p. 601). The exploration of "complex and contingent relationships" (Lawless & Pellegrino, 2007, p. 608) creates information rich data that is inevitably challenging in the analysis and reporting phases. Lawless and Pellegrino (2007) conclude:

> [There is] a great need to develop a structured and theoretically grounded approach to evaluating the impact of technology-based professional development. By and large, the use of systematic designs, driven by specific research questions, was a missing element in this literature base (p. 598).

1.4 Issue #3: Changing Teachers' Beliefs

Brickner (1995 as cited in Ertmer, 1999), in an unpublished doctoral thesis, describes factors that inhibit the implementation of new teaching practices as either first or second order barriers to change. First order barriers to change refer to those factors that are "extrinsic to teachers" (Ertmer, 1999, p. 48). In technology integration, these factors include the support of the principal, access to equipment, and time for learning new skills and curriculum planning. Second order barriers to change refer to factors that are "intrinsic to teachers and include beliefs about teaching, beliefs about computers, established classroom practices, and unwillingness to change" (Ertmer, 1999, p. 48). Ertmer (1999) concludes that even if first order barriers are resolved, that is, principal support, equipment access, and planning and development time is provided; teachers are not likely to move beyond enhancing the efficiency and effectiveness of familiar practices. Meredyth, Russell, Blackwood, Thomas, and Wise (1999) support this conclusion and argue that too much emphasis has been placed on addressing first order barriers, for example, improving children's access to computers. This is reflected in educational institutions and governments reporting on student/computer ratios, as previously described. An investigation is needed to develop a professional development model that will address second order barriers, with an emphasis on teachers achieving the best outcomes within the limitations of their context.

Professional development that addresses second order barriers will challenge teachers' belief systems and practices, as well as "reformulating basic school culture notions regarding what constitutes content and content coverage, [and] what comprises learning and engaged time" (Ertmer, 1999, p. 48). Kerr (1999) agrees that "the principal issue in working with teachers must be how they themselves define their work" (p. 184). Therefore teachers need to be confident that their experimentation and implementation of new practices will be judged favourably by their peers and supervisors as being effective, and that the new practices will also improve student outcomes. As a conclusion in their own study of these effects, Blasi, Heinecke, Bartley, Blasi, Milman, and Dawson (1999) say "teachers' beliefs and thinking about ICTs is socially constructed within local contexts. These local contexts include the role of the principal, peer relations and resource support. Teacher beliefs and prior experience influenced their instructional computer use" (p. 1310). This is a key issue in this study, and it will be argued that an effective response is for workshops to be presented by teachers who talk enthusiastically to their fellow teachers about the progress they have made in the integration of technology.

1.4.1 Definition of Beliefs

Beliefs and knowledge are sometimes viewed as synonymous, but the distinctions made by Pajares (1992) apply in the context of this study. That is, knowledge refers to an "objective fact" while beliefs require personal "evaluation and judgment" (p. 313). There is specific knowledge required by teachers as they integrate technology, for example, objective facts about how particular applications function that are universal and unlikely to vary within a context. It is assumed that the transfer of such knowledge is less problematic in that it involves exposure to the knowledge and repetitious practice, albeit in a meaningful and supportive manner. For example, a teacher may not have previously owned a digital camera, but would soon gain the knowledge and skills to use one if it was demonstrated and they take it with them on their holidays. Beliefs, on the other hand, have an important role "in helping people to understand themselves and others and to adapt to the world and their place in it" (Pajares, 1992, p. 317). Because beliefs play such a central role in defining who we are, there are associated effects when attempting to change teachers' beliefs. For example, teachers will feel uncomfortable and their confidence will be undermined when their deeply held beliefs are challenged (Pajares, 1992).

Beliefs also affect teachers' perceptions and have a critical role in the processing of new information. For example, the perseverance phenomena, described by Nisbett and Ross (1980), highlights this cognitive and information-processing aspect of beliefs that operates together with emotional aspects. That is, people have the capacity to rationalize an explanation even when a belief is based on information that can be shown to be incorrect. Furthermore, beliefs can lead to self-fulfilling prophecies because beliefs affect perceptions that in turn affect behaviours (Pajares, 1992). The implication for a professional development program is that teachers may revert to an existing practice even though it has been shown that a new practice is more effective. That is, it will not be sufficient to demonstrate to teachers a new practice, as was the case with learning to use a digital camera, and then try to convince them that the practice should be adopted.

1.4.2 Beliefs about Teaching

Teachers have a wide range of beliefs about the world around them, but the most relevant types of beliefs for this study include:

1. confidence to affect students' performance (teacher efficacy);
2. nature of knowledge (epistemological beliefs);
3. causes of teachers' and students' performance (attributions, locus of control, motivation, writing apprehension, math anxiety);
4. perceptions of self and feelings of self-worth (self-concept, self-esteem);
5. confidence to perform specific tasks (self-efficacy); and
6. specific subjects or disciplines (reading instruction, the nature of reading, whole language) (Pajares, 1992, p. 316).

Each of these beliefs have a role in the day to day function of teaching, and exemplify the complexities involved in developing a professional development program if each is to be addressed. Furthermore, attending to one belief may well be counterproductive in attending to other beliefs. For example, convincing teachers that their epistemological beliefs are not adequate and need reforming may be detrimental to their other beliefs such as self-concept, self-esteem, and self-efficacy.

Nespor (1987) describes four features of beliefs. First, existential presumption is normally associated with beliefs about God or supernatural occurrences, but may also be found in teachers' perceptions such as a belief that some children are not achieving because they are lazy.

By attributing underachievement to laziness, the teacher is able to come to terms with the issue as being beyond their control. Second, alternativity, is the concept of an ideal situation. Alternativity for teachers is their vision of what they want their classroom to be. While this vision may not reflect what is actually happening in the classroom, it is part of the process by which teachers define goals and activities. The third feature is the affective nature of beliefs, including "feelings, moods and subjective evaluations" (Nespor, 1987, p. 324). This feature is likely to impact on teacher expectations and the importance placed on particular subject matter. Fourth, episodic structure refers to past experiences or episodes that are likely to impact on the affective state of a teacher (Nespor, 1987). For example, teachers learn about teaching from their own experiences as a student, particularly if they had an influential teacher or if there was an experience that later served as a template for actions. Pajares (1992) suggests that the "earlier a belief is incorporated into the belief structure, the more difficult it is to alter" (p. 325). Therefore, the beliefs that teachers form as children, during pre-service training, and as young teachers are likely to be strong beliefs. Furthermore, beliefs are episodic in nature and include "affective feelings and evaluations, vivid memories of personal experiences, and assumptions about the existence of entities and alternative worlds" (Nespor, 1987, p. 321). The proliferation of technology and technology integration are events that have come late in the life of many teachers, and they may struggle to come to terms with what this means in relation to their early experiences both as a teacher and student. For example, a 50 year old teacher would have no problem picking up a piece of chalk and instructing from the front of the class because this is how they were most likely taught themselves. They are likely to have few or no experiences in their lives that relate to effective teaching with technology.

1.4.3 Teaching as an Ill-Structured Domain

The nature of teaching is such that "beliefs play a major role in defining teacher tasks and organizing knowledge and information relevant to those tasks" (Nespor, 1987, p. 324). This is because teaching involves "ill-structured problems" (p. 324). For example, a lesson may have multiple goals and teachers are not even sure when some of those goals are achieved. There is not always a proven strategy to attain a particular goal, and in any case, strategies may rely on contextual knowledge or assumptions about the learners. Teaching also involves "entangled domains" (p. 325). That is, "entities which can be identified by some criteria as belonging to a given domain, but which at the same time do not share some important sets of criteria" (p. 325). Nespor (1987) says "beliefs are peculiarly suited for making sense of such contexts" (p. 324). Well-structured problems may be found in the classroom, e.g., in a series of mathematical problems in a text book. However, these problems develop skills that can only be used to solve similar problems, and are based on an "assumption that skills in solving well-structured, classroom problems will transfer positively to real world, situated, ill-structured problems" (Jonassen, 1997, p. 68).

Table 1.4 lists the differences between well- and ill-structured problems noted by Jonassen (1997), as well as the problem solving processes and instructional designs that he proposes are appropriate for each type of problem. These differences, processes, and instructional designs will need to be considered because within the topic of technology integration there are well structured problems such as acquiring skills in the use of equipment. There are also ill-structured problems that require teachers as learners to be creative and identify and select from alternative responses.

Table 1.4: Well- and Ill-Structured Problems

Well-Structured Problems	Ill-Structured Problems
1. Present all elements of the problem; 2. Are presented to learners as well-defined problems with a probable solution; 3. Engage the application of a limited number of rules and principles that are organized in a predictive and prescriptive arrangement with well-defined, constrained parameters; 4. Involve concepts and rules that appear regular and well-structured in a domain of knowledge that also appears well-structured and	1. Appear ill-defined because one or more of the problem elements are unknown or not known with any degree of confidence; 2. Have vaguely defined or unclear goals and unstated constraints; 3. Possess multiple solutions, solution paths, or no solutions at all; 4. Possess multiple criteria for evaluating solutions; 5. Have no prototypic cases because case elements are differentially important in different contexts and because

predictable; 5. Possess correct, convergent answers; 6. Possess knowable, comprehensible solutions; and 7. Have a preferred, prescribed solution process.	they interact; 6. Present uncertainty about which concepts, rules, and principles are necessary for the solution or how they are organized; 7. Possess relationships between concepts, rules, and principles that are inconsistent between cases; 8. Offer no general rules or principles for describing or predicting the outcome of most of the cases; 9. Have no explicit means of determining appropriate action; 10. Require learners to express personal opinions or beliefs about the problem, and are therefore uniquely human interpersonal activities; and 11. Require learners to make judgments about the problem and defend them.
Problem Solving Process	
1. Problem presentation; 2. Search for solutions; 3. Recall analogical problems 4. Means-ends analysis; 5. Decomposing and simplifying; generate/test; and 6. Implement solutions.	1. Learners articulate problem space and contextual constraints; 2. Identify and clarify alternative opinions, positions, and perspectives of stakeholders; 3. Assess the viability of alternative solutions by constructing arguments and articulating personal beliefs; 4. Monitor the problem space and solution options; 5. Implement and monitor the solution; and 6. Adapt the solution.
Instructional Design	
1. Review prerequisite component concepts, rules, and principles; 2. Present conceptual or causal model of problem domain; 3. Model problem solving performance in worked examples; 4. Present practice problems; 5. Support the search for solutions; and 6. Reflect on problem state and problem solution.	1. Articulate problem context; 2. Introduce problem constraints; 3. Locate, select, and develop cases for learners; 4. Support knowledge base construction; 5. Support argument construction; and 6. Assess problem solutions.

(Jonassen, 1997, pp. 68-86)

The principles of learning and instruction in complex and ill-structured domains listed by Koschmann, Kelson, Feltovitch, and Barrows (1996) in Table 1.5 also apply to professional development for technology integration. For example, teachers need to be presented with different perspectives of the same problem, teachers need to take an active role in and articulate their learning, teachers need opportunities to adapt what they have learned to their classroom practice, and learning has to be authentic and on-going.

Table 1.5: Principles of Learning in Complex and Ill-Structured Domains

	Principle	Learning	Instruction
1.	Principle of Multiplicity	Knowledge is complex, dynamic, context-sensitive, and interactively related.	Instruction should promote multiple perspectives.
2.	Principle of Activeness	Learning is an active process, requiring mental construction on the part of the learner.	Instruction should foster cognitive initiative and effort after meaning.
3.	Principle of Accommodation and Adaptation	Learning is a process of accommodation and adaptation.	Instruction should stimulate ongoing appraisal, incorporation and/or modification of the learner's understanding.
4.	Principle of Authenticity	Learning is sensitive to perspective, goals, and context, that is, the learner's orientation, goals, and experiences in the learning process determine the nature and usability of what is learned.	Instruction should provide for engagement in the types of activities that are required and valued in the real world.
5.	Principle of Articulation	Learning is enhanced by articulation, abstraction, and commitment on the part of the learner.	Instruction should provide opportunities for learners to articulate their newly acquired knowledge.
6.	Principle of Termlessness	Learning of rich material is termless.	Instruction should instil a sense of tentativeness with regard to knowing, a

	realization that understanding of complex material is never "completed," only enriched, and a life-long commitment to advancing one's knowledge.

(Koschmann et al., 1996, p. 89)

1.4.4 Changing Teachers' Beliefs

A further implication for this study of professional development is that "pedagogical beliefs go deeper than technological capability or accessibility; beliefs define how teachers teach both with and without technology" (Ertmer et al., 2000, p. 7). The risk in simply skilling teachers in using the new technologies is that they will use that technology in limited ways to enhance existing practices. In order to adopt new practices, teachers need to become self-conscious and reflective of their beliefs, and new beliefs would need to be developed to replace the old beliefs (Nespor, 1987). The episodic nature of beliefs and the relationship of beliefs to teachers' experiences (Calderhead & Robson, 1991; Nespor, 1987; Pajares, 1992) mean that beliefs are more likely to be changed through experience than through deductive argument from principles. A dependence on change through the learning of new principles is also problematic because of the difficulty in knowing which principles to apply in addressing ill-structured problems (Nespor, 1987).

There are two strategies that could be effective in changing teachers' beliefs about new practices. The first strategy is to confront teacher's beliefs as suggested by Otto (2003) in appendix A. Pajares (1992) proposes the following four step process needs to take place when teachers are confronted with alternate beliefs before they are likely to reflect on and alter their own beliefs:

1. understand that new information represents an anomaly;
2. believe that the information should be reconciled with existing beliefs;
3. want to reduce the inconsistencies among the beliefs; and
4. [perceive that] efforts at assimilation . . . are unsuccessful (p. 321).

Sandholtz and Ringstaff (1996) observed this process in the classroom when teachers changed their teaching behaviours in the Apple Computers of Tomorrow (ACOT) project. They also attributed those changes to conflicts between teachers' classroom experiences and their beliefs. The second strategy is to present multiple perspectives, as suggested by Jonassen (1997) in Table 1.4 and Koschmann et al. (1996) in Table 1.5. However, both strategies can be incorporated into the one approach involving teachers accessing cases of other teachers performing the practices. For example, Levin (1995) conducted a study of elementary teachers who were exposed to new practices as a written case, as distinct from the real life experiences of the classroom in the ACOT project. She concluded it was teachers' discussions about the case that "may be a catalyst for recognizing the need to change or articulate one's thinking" (p. 76). An understanding of the problems that teachers are required to solve in the classroom relating to technology integration needs to be developed in order to fully appreciate the potential role of cases in supporting teachers to solve those problems.

The integration of technology has resulted in the everyday work of teacher instruction becoming more complex and involving more ill-structured problems. Traditional instruction is likely to be linear in nature, for example, the progression of knowledge acquisition from the beginning to the end of a textbook. However, technology facilitates "random access instruction [which refers] to a cluster of fundamental issues brought into play by nonlinear learning with random access media" (Spiro & Jehng, 1990, p. 163). This form of instruction is "better suited to conveying complex content" (Spiro & Jehng, 1990, p. 163). As the problems that teachers deal with become ill-structured, "the goals of learning shift (a) from the attainment of superficial familiarity with concepts and facts to the mastery of important aspects of conceptual complexity, and (b) from knowledge reproduction to knowledge use (transfer, application)" (Spiro & Jehng, 1990, p. 165). Advanced knowledge acquisition requires complex content "and the relationships across the cases that knowledge has to be applied to become more regular" (Spiro & Jehng, 1990, p. 165). Cases that present the same knowledge from multiple perspectives will therefore benefit the learning process.

Feltovich, Spiro, Coulson, and Feltovich (1996) further explain this phenomenon in their description of problems for learners in ill-structured domains. The first problem is that an "over-reliance in early instruction on a single analogy" (Feltovich et al., 1996, p. 30) can be harmful when learning progresses and becomes more complex. That is, the wrong analogy taught early is hard to change. The second problem is the "reduction to restricted perspective [where] only one of, or a small number of the legitimate and useful ways a topic or phenomenon could be construed are recognised or considered" (Feltovich et al., 1996, p. 31). Both of these problems are examples of the learner being asked to consider "too little of something greater - too few perspectives, too few dimensions" (Feltovich et al., 1996, p. 31).

An appropriate response to this issue lies within cognitive flexibility theory as explained by Spiro and Jehng (1990):

> By re-presenting the same information in different contexts and from different perspectives, the complexity of that information is made resistant to over-simplification. As a result, knowledge representation is made more multidimensional - and knowledge that will have to be used in many different ways has to be represented in many different ways, with the potential to form various combinations with other aspects of knowledge as required by new contexts of knowledge use (p. 165).

There is a variety of ways that knowledge can be applied in solving ill-structured problems such as those encountered in technology integration. Because at least some of the problems teachers encounter will be unique, teachers as learners must be able to independently apply the knowledge they have gained through professional development. It is the recall of a "cognitively tractable picture of the landscape of varieties of knowledge use" (Spiro & Jehng, 1990, p. 203) and their ability to adapt and apply that knowledge to new situations that should be the goal of quality professional development programs. The strategy already proposed to achieve this goal is to present teachers with cases that depict the various ways in which problems associated with technology integration have been solved.

1.4.5 Beliefs, Principles, and Practices

While beliefs influence behaviour, it is also apparent that teaching approaches do not always reflect those beliefs that teachers say they hold as being most important. Fokias (1999) recognized this problem when he reflected on the difficulty in "maintaining consistency between [his] values and [his] actions" (p. 22). Atkin (1996) recommends this process to assist teachers in developing "practices congruent with values and beliefs" (p. 16):

1. each identify one of your strongly held values or beliefs about learning;
2. how, in principle, do you work towards this belief?
3. give three examples of different practices which are congruent with this principle and its underlying belief;
4. identify barriers (or potential barriers) to this belief being lived out in practice; and
5. identify a practice which is not congruent with your belief (p. 16).

In this study of professional development, it will be necessary to differentiate between what participants "say, intend or do" (Pajares, 1992, p. 327). That is, teachers and school administrators may believe that a particular approach to teaching is more effective, but are unable to apply that approach in practice. Atkin (1996) established a link between beliefs, principles, and practices, and suggests that by considering beliefs, principles, and practices together, attention is focused on congruency in what teachers and school administrators "say, intend [and] do" (Pajares, 1992, p. 327). Furthermore, because beliefs are specific to a particular context (Bandura, 1997), self-reporting lists or inventories of beliefs provide only limited information. Pajares (1992) recommends therefore that "additional measures such as open-ended interviews, responses to dilemmas and vignettes and observation of behaviour must be included if richer and more accurate inferences are to be made" (p. 327).

1.4.6 Self-Efficacy

Self-efficacy is defined as the capacity to control one's level of functioning and also control events that affect that level of functioning (Dimmock & Hattie, 1996). High self-efficacy is a factor in creating conditions for change, reducing stress levels, and enabling coping with unfamiliar situations. Efficacy is an element of empowerment that is, "taking charge of one's own growth and resolving one's own problems" (Ghaith & Shaaban, 1999, p. 495). Meltzer and Sherman (1997) believe low self-efficacy in the new technologies is a reason for reluctance in adopting innovation. On the other hand, teachers with high self-efficacy are in a better position to initiate and sustain change because they have the confidence to take advantage of new opportunities (Dimmock & Hattie, 1996). Self-efficacy plays a role in being innovative or implementing change because there may not be an established program to follow (Tinkler, Lepani, & Mitchell, 1996). Experimentation involves negative influences such as failure and time wasting and an innovator needs to be confident that they can work through problems (Szabo, 2001).

Computer self-efficacy "refers to a judgement of one's capability to use a computer" (Compeau & Higgins, 1995, p. 192). In a study of computer self-efficacy in a sample of 394 subscribers to a Canadian business periodical, Compeau, Higgins, and Huff (1999) reached these conclusions:

1. Low self-efficacy, if not managed, will pervade an individual's behaviour to a significant extent over a prolonged period of time;
2. If successful use requires users who are confident in their ability to use available technologies, training programs and other support mechanisms to increase self-efficacy may need to be undertaken; and
3. Self-efficacy with respect to information technology use will continue to be a factor in our choices about what technologies to adopt, how much to use them (if we have that choice), and how much to persist in the face of obstacles to successful use of such technologies (p. 155).

There are three dimensions of self-efficacy:

1. The magnitude of self-efficacy can be interpreted to reflect the level of capability expected;
2. The strength of a computer self-efficacy judgment refers to the level of conviction about the judgment; and
3. Self-efficacy generalizability reflects the degree to which the judgment is limited to a particular domain of activity (Compeau & Higgins, 1995, p. 192).

There is a need to consider teacher self-efficacy in a professional development program from the point of view of limiting participant stress and enhancing the teachers' capacity to take on new challenges in the classroom. Ross, Hogaboam-Gray, and Hannay (2001) believe there is a further reason for attending to teacher self-efficacy in technology because of the growing evidence that there is a link to student outcomes. In a study of 387 students aged 6-9, Ross et al. (2001) investigated "the effects of a change in teacher efficacy when students moved to a new grade" (p. 141). They concluded that students benefited when moved to a class that had a teacher of high efficacy, and the converse was also true when students moved to a class that had a teacher with low self-efficacy.

1.4.7 Previous Study of Beliefs about Teaching with ICTs

In a previous study (Otto, 2003), the researcher raised concerns that principals may be uncertain in their beliefs about teaching with ICTs. The three principals who participated in the study were inconsistent in describing the exemplary use of ICTs in classrooms. They had limited experience in teaching with ICTs and did not have access to this technology during their formative years as teachers. It was also noted in the study that the 'real world' of the classroom imposed limitations on the implementation of practices. That is, teachers and principals were not able to implement practices which they believed to be effective. This uncertainty about what constitutes exemplary practice and the constrictions on implementing exemplary practices are reflected in the following issues raised in the previous study (Otto, 2003):

1. How should knowledge be managed in the classroom?
2. How does a teacher's view of knowledge influence their approach to teaching?
3. How should traditional approaches to teaching be balanced with constructivist compatible theories of learning?
4. How should print-based pedagogies be balanced with ICT based pedagogies?
5. What software is appropriate and how should it be used?

6. How should children's access to ICTs be organised?
7. How does the personal use of ICTs relate to teaching with ICTs?
8. How should learning objectives and the curriculum be organised?
9. How should teachers evaluate their teaching with ICTs?
10. How should the use of ICTs change with the age of the children? and
11. How should the use of ICTs change when teaching children from different socio-economic backgrounds?

Developing shared understandings and beliefs within the school community is a central process in Hill and Crévola's (1997) general design for improving learning outcomes. Therefore, school leaders must be confident in their beliefs about exemplary teaching if they are to contribute to the development of shared understandings and beliefs (Meredyth et al., 1999; Robyler, 1993; Ertmer, 1999; Albion & Ertmer, 2002).

In the previous study, the researcher proposes a model (see appendix A) to engage principals in taking on new beliefs and in doing so develop a vision for teaching with ICTs (Otto, 2003). The model refers to issues already discussed in this chapter about the effect of new beliefs confronting old beliefs, and was developed from the four sources of information to enhance self-efficacy proposed by Bandura (1986). That is, principals would observe the behaviour, enact the behaviour, be persuaded of the benefits of the behaviour, while at the same time attending to affective influences, such as their skill to operate ICTs efficiently. These principles would be useful in devising activities for a professional development project.

1.5 Towards a New Approach

In consideration of the issues associated with professional development for technology integration, Hughes and Holmes (2005) recognise the potential of "recent trends in research on professional development [related] to new understandings of the nature of learning and knowing that collectively have been labelled 'situative'" (p. 309). There are three central themes to situative perspectives identified by Putnam and Borko (2000):

1. The physical and social contexts in which an activity takes place are an integral part of the activity, and that the activity is an integral part of the learning that takes place within it;
2. Interactions with the people in one's environment are major determinants of both what is learned and how learning takes place; and
3. The distribution of cognition across people and tools [make it possible] to accomplish cognitive tasks beyond the capability of any individual member (pp. 4-5).

The conceptual tools that emanate from the situative perspective are useful in guiding the design and evaluation of new approaches to professional development programs for technology integration. While the situative perspective may not provide all the answers, it is a starting point for asking the key and relevant questions (Putnam & Borko, 2000).

Sfard (1998) applies the metaphor of acquisition to describe learning as an entity that may be passed from one person to another. For example, a teacher acquires knowledge, a concept, or an idea and helps the student to acquire, construct or internalize that knowledge, concept or idea. Brown, Collins, and Duguid (1989) suggest that didactic methods of instruction are based on this acquisition metaphor. Knowledge as an entity is seen as independent of the situations in which it is applied and in which it is learned. Furthermore, knowledge is seen as being separate from activity. The situated perspective, on the other hand, insists that cognitive experiences take place in authentic activities (Duffy & Jonassen, 1992). These activities are "not separate from or ancillary to learning and cognition. Nor is it neutral. Rather, it is an integral part of what is learned" (Brown et al., 1989, p. 32).

Authentic practice takes place in a social context and therefore the community of practice taking part in that activity is a factor in the learning process (Wilson & Myers, 1999). "Communities of practice are groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis" (Wenger, McDermott, & Snyder, 2002, p. 4). These communities are "repositories and conveyors of meaning and serve to [legitimize] action. Communities construct and define appropriate discourse practices" (Wilson & Myers, 1999, p. 71). A social context carries with it a history of "experiences and interactions of participants, as well as anticipated needs and events" (Wilson & Myers, 1999, p. 71). The community of practice will impact on a study of professional development in two ways. The first concerns the methodology of the study. "We must go into the community of the practitioner, using ethnographic methods of observation and reflection, and become participant observers. We develop a focus on how the community learns" (Clancey, 1995, pp. 33-34). The second concerns the instructional design of the program. "We must use methods of participatory design in which the worker participates in redesign practices with the designer" (Clancey, 1995, p. 38).

The learning system design that best meets the principles of the situative perspective is a learning environment. Learners may become involved in the design of the learning environment as suggested by Clancey (1995), and learners may engage in "meaningful and purposeful activities . . . [and] social interaction and cooperative learning" (Vosniadou, 1996, p. 13). Choi and Hannafin (2003) outline in Table 1.6 the theoretical underpinnings of situated learning environments.

Table 1.6: Implications for the Design of Situated Learning Environments

Framework		Principles	
1.	Role of Context	a.	Everyday cognition: people reason intuitively based upon experiences within specific contexts; use a variety of methods to solve problems;
		b.	Authenticity: coherent, meaningful and purposeful activities that represent the ordinary practises; and
		c.	Transfer: situated learning environments are more likely to transfer to real-life problem solving.
2.	Role of Content	a.	Knowledge as tool: students acquire knowledge as well as a sense of when and how to use it;
		b.	Content diversity and transfer: concepts need to be represented via various content: necessity to apply knowledge in various settings to discriminate similarities and differences among settings;
		c.	Cognitive apprenticeships: to provide the opportunities for the learners to internalise learning and develop self-monitoring and self-correcting skills; and
		d.	Anchored instruction: to create authentic, problem-rich environments that encourage exploration and diversity of perspectives.
3.	Role of Facilitation	a.	Facilitation methods: situated learning environments attempt to help students to improve their cognitive abilities, self-monitoring and self-correcting skills; encourage active learning and provide opportunities to internalise information; facilitation is less directive, more continuous, and highly interactive a. modelling; b. scaffolding; c. coaching, guiding, and advising; d. collaborating; e. fading; f. using cognitive tools and resources.
4.	Role of Assessment	a.	Problems and issues: to be useful in promoting higher order skills, testing needs to shift from domain referenced evaluation to assessments; emphasis on the ability to diagnose and manage cognitive growth rather than achievement;
		b.	Trends in situated learning environments a. Self-referencing; b. flexible, transferable knowledge and skill; c. diversity and flexibility of learning centred measures; d. generating and constructing; e. continuous, on-going process; f. ecological validity; and
		c.	Assessment methods a. portfolios; b. performance assessment; c. concept maps.

(Choi & Hannafin, 2003, par. 5)

1.5.1 Constructivist Learning Environments

Wilson (1995a) defines a learning environment as "a place where people can draw upon resources to make sense out of things and construct meaningful solutions to problems" (p. 30). The addition of the word *constructivist* "is a way of emphasizing the importance of meaningful, authentic activities that help the learner to construct understandings and develop skills relevant to solving problems" (p. 30). As previously discussed, the social context is an important aspect of authentic activity and is therefore included in Wilson's (1995a) definition of a constructivist learning environment as "a place where learners may work together and support each other as they use a variety of tools and information resources in their guided pursuit of learning goals and problem-solving activities" (p. 5). Jonassen, Davidson, Collins, Campbell, and Haag (1995) also emphasize the role of the community of practice when they say "constructivist environments engage learners in knowledge construction through collaborative activities that embed learning in a meaningful context and through reflection on what has been learned through conversation with other learners" (p. 13).

Ravitz et al. (2000) suggest that to develop a constructivist learning environment in which learning is a more "self-directed, personally-responsive and socially-mediated process" (p. 4), learners should:

1. identify their own issues and problems to be solved rather than having questions defined for them;
2. decide how to explore an issue or solve a problem rather than having these procedures defined by the teacher;
3. reflect further and make sense of what they have experienced; and
4. interact with peers by presenting their solutions, describing how solutions were reached, and receiving feedback (p. 4).

Activities within a learning environment include projects, group work, problem solving, and reflective thought through writing. Tasks engage learners in meaningful thinking, i.e., "engaging them in a way that they consider both new information and their own prior understandings and beliefs and attempt to work out syntheses of both the old and the new" (Ravitz et al., 2000, p. 5). These tasks include having learners "make conjectures, eliciting their opinions, having them explicitly work on issues related to their own experiences, and arguing from various points of view" (Ravitz et al., 2000, p. 5). The structure of a constructivist learning environment and the proposed activities is discussed in the literature review in Chapter Two.

1.5.2 An ePortfolio Professional Development Project

The purpose of a constructivist learning environment is to support learning about an issue and the problems generated by that issue. The issue selected to investigate a new approach to professional development for technology integration is the classroom implementation of ePortfolios. An ePortfolio is a simple concept that is quickly grasped by teachers in that students digitally record their achievements. Teachers readily visualise how ePortfolios can be integrated into their classroom routines. Despite the simplicity of the concept, discussion in chapter two will demonstrate how the implementation of ePortfolios has the potential to change the way teachers teach. Teachers are challenged intellectually as the implications of implementation become apparent, and are further challenged in learning new knowledge and skills and adjusting classroom management practices. An advantage of ePortfolios from a professional development perspective is that teachers can implement ePortfolios in stages, and regulate their learning accordingly.

A quality ePortfolio professional development project should address the issues discussed in this chapter. For example, the project must be sustained to support teachers through the various phases, from initial enthusiasm to the mastery of concepts and skills, from classroom trials to the arduous task of building established practice, and from self-doubt to self-efficacy. Activities in an ePortfolio professional development project have to be appropriate for each element, e.g., an activity to support teachers as they learn computer applications will be different from an activity that supports curriculum integration. The project will need a clear and articulated set of guiding principles if teachers are to be taught as the project goals would have them teach. That is, the teachers need to be aware of how they are being taught, so they can apply the same principles in their classrooms. In common with other technology applications, the implementation of ePortfolios supports both traditional and constructivist-compatible approaches to teaching. However, as a constructivist-compatible approach to teaching, ePortfolios can form the underlying structure for a classroom to become a constructivist learning environment. Teachers will need to develop awareness of the type of ePortfolio they are implementing because this will reflect their approach to teaching. Successful implementation of ePortfolios will require the support of school administrators, e.g., to provide resources and to ensure that ePortfolios align with other school initiatives. Therefore the ePortfolio professional development project will need to include administrators so they can develop an understanding of the concept and the issues associated with implementation.

1.6 The Investigation

While a constructivist learning environment may prove to be a useful structure to organise activities for an ePortfolio professional development project, there is no inherent capacity within such an environment to answer the questions critical to this investigation. That is, there needs to be a framework developed that will facilitate the creation of a constructivist learning environment, ensure that the environment is sustained, and evaluate its effectiveness and efficiency in terms of improved achievements for students, increased knowledge and skills for teachers, changes in teaching practices, and value to the educational organisation. The development and application of a framework and the identification and articulation of the underlying principles of the instructional design will contribute to a “knowledge base derived from research about what works and why with regard to technology, teaching, and learning” (p. 576) that Lawless and Pellegrino (2007) believe is not often the case in other studies.

1.6.1 Research Questions

Based on consideration of the literature and the purpose of the study, the following research questions have been identified:

1. What framework can be developed to guide the design and implementation of a constructivist learning environment to support the professional development of teachers and school administrators about ePortfolios?
2. How effective is a constructivist learning environment in supporting the professional development of teachers and school administrators about ePortfolios? and
3. Can the framework be applied in other projects to guide the design and implementation of a constructivist learning environment to support professional development?

1.6.2 Objectives of the Study

To further define the study, the following objectives have been identified from a review of the relevant literature:

1. To initiate a professional development project to support teachers and school administrators in their learning about ePortfolios;
2. To develop a framework to guide the design and implementation of a constructivist learning environment as the theoretical basis for the project;
3. To apply technology to enhance the constructivist learning environment;
4. To evaluate how and in what ways teaching practices have changed as a result of the project;
5. To evaluate the sustainability and institutionalisation of the project in terms of its effectiveness, efficiency, and relevance;
6. To evaluate the potential for the instructional design and learning activities of the project to be transferred to other contexts; and
7. To expand our understanding of theories through a focus on understanding the cases and seeking practical understanding of meanings and actions.

Chapter 2: Literature Review

To investigate the research questions, a professional development project was initiated that designed, developed, and implemented a constructivist learning environment to support teachers and school administrators in their professional learning about ePortfolios. Bednar, Cunningham, Duffy, and Perry (1992) say "instructional design and development must be based upon some theory of learning and/or cognition [and that] effective design is possible only if the developer has developed reflexive awareness of the theoretical basis underlying the design" (p. 19).

Contemporary theory will therefore underpin the project in at least four ways. First, there is the theory that will influence and be reflected in the constructivist learning environment developed as the instructional design of the project including the structure of activities. Second, there is the theory that will contribute to the content of the professional learning including a review of the contemporary literature on ePortfolios and exemplary teaching with technology, as well as an investigation of the latest technology available to schools. Third, there is the theory about learning associated with different approaches to teaching that will influence and be reflected in (a) the design of the ePortfolios that teachers and school administrators are encouraged to implement in their schools; and (b) the changes in teaching practices as an outcome of participation in the project. That is, different types of ePortfolios have goals and purposes that support approaches to teaching derived from different theories about learning. It will be argued that the classroom practices of teachers who implement a particular type of ePortfolio will be aligned with the theories about learning associated with that ePortfolio. Fourth, there is the theory that will contribute to the Professional Development Framework (see appendix B) that emerges during the course of the project. The Professional Development Framework is a series of structured questions that guides the design of the constructivist learning environment, ensures that the environment is sustained, and evaluates its effectiveness and efficiency in terms of improved achievements for students, increased knowledge and skills for teachers, changes in teaching practices, and value to the educational organisation.

If teachers are to be taught as they should teach, the underlying theory will need to be consistent across all four ways that it underpins the project. As Duffy and Jonassen (1992) say, "theories of learning and prescriptions of practice must go hand in hand" (p. 2). That is, the theory driving the instructional design of the professional development project must be consistent with the design of activities, the ePortfolios and teaching practices proposed, and the evaluative phases of the Professional Development Framework. Furthermore, the project participants should be able to recognise and reflect on the theory applied in the four applications as distinguishable from alternate theories. Bump (2001) says:

> If teachers are trained in the traditional, lecture style with the professor dispensing all the knowledge, then it is more likely that they will continue to teach this way. But if the professor will model for them a collaborative, constructivist, interactive environment, then teachers will begin to see the exciting possibilities that exist for them and their students (p. 388).

While teachers may have "an intuitive sense of what makes good practice good teaching" (Burgess, 2003), they also "need to be aware of personal beliefs about the nature of learning and select concepts and strategies from those theories which are consistent with those beliefs" (Bednar et al., 1992, p. 19). Similarly, teachers are intuitively drawn to the concept of ePortfolios and readily visualise a role for ePortfolios in their classrooms. The role of the professional development project will be to increase their knowledge about the theory behind what they do intuitively, and to support reflective processes while their long held beliefs are challenged. This is what Otto (2003) intended in the model to confront principals' beliefs in appendix A.

This research study was undertaken over a period of five years, from the end of 2003 to the end of 2008. The length of the study allowed the Professional Development Framework (see appendix B) to be developed in one project and refined in another project. However, much of the literature relating to the study had to be reviewed at the start of the first project because of the role of the literature as explained in the paragraphs above. That is, the literature guided the instructional design of the *ePortfolio Project* and contributed to an information booklet distributed to participants at the beginning of 2005. At the same time, the review of the literature was an on-going feature of the study because of the dynamic nature of technology integration.

2.1 Instructional-Design Theory

Reigeluth (1999) describes instructional-design theory as "theory that offers explicit guidance on how to better help people learn and develop" (p. 5). Instructional-design theory generates "methods for facilitating human learning and development . . . and indications as to when and when not to use those methods" (p. 8). Reigeluth (1999) further explains that instructional-design theory focuses on the means of attaining the goals of a professional development project, rather than the results of particular events within the project. That is, the probability that learning will occur is increased by focusing on the *process* of supporting teachers and school administrators in their learning about ePortfolios rather than focusing on the *product* of what participants know about ePortfolios. An emphasis on *process* is appropriate in an ePortfolio project. While there are key understandings about ePortfolios that need to be addressed, the success of a professional development project to support the implementation of ePortfolios will be measured in terms of the extent those understandings are applied in practice.

Learning in a professional development project should be a continuous and evolving process that includes experimentation and consideration for the context (Reigeluth, 1999). That is, methods are situational rather than universal, and instructional conditions as a component of instructional-design theory may include:

1. the nature of what is to be learned (e.g., understandings are learned differently from the way skills are learned);
2. the nature of the learner (e.g., prior knowledge, learning strategies, and motivations);
3. the nature of the learning environment (e.g., independently at home, in a group of 26 students at school, in a small team in a business); and
4. the nature of the instructional development constraints (e.g., how much time and money you have for planning and developing the instruction) (Reigeluth, 1999, p. 8).

The basis for instructional design is the assumption that learners' reactions are predictable and that "what is taught has some factual, conceptual, rule-based or procedural foundation in the real world" (Winn, 1991, pp. 189-190). If, as constructivists propose, knowledge is constructed by students and there is "no objective reality to teach them" (Winn, 1991, pp. 189-190), then what is left for the instructional designers to do to improve student understanding? Winn (1991) suggests they continue to design instruction to develop basic knowledge in the well-structured domains. For example, there is basic knowledge associated within the *ePortfolio Project* that is more efficiently transmitted using direct instruction methods, e.g., the operation of a piece of software that does not vary under different conditions. However, to address the ill-structured domains associated with the classroom implementation of ePortfolios, Winn (1991) believes that shells should be designed that include strategies and content that are available to the learner at the moment of learning, and not decided before hand. Such a shell would need to be flexible to allow the learners to "move around inside a knowledge domain . . . constructing relationships and revisiting ideas" (p. 205). Similarly, Wilson (1995a) perceives "the job of instructional-design theory is to articulate a set of principles or conceptual models to aid teachers and designers in creating supportive, nurturing, learning environments" (p. 5).

2.2 Constructivist Learning Environments

As discussed in chapter one, Wilson (1995a) defines a constructivist learning environment as "a place where learners may work together and support each other as they use a variety of tools and information resources in their guided pursuit of learning goals and problem-solving activities" (p. 5). Wilson (1995a) adds that learning environments may be seen as "intrinsically fuzzy and ill-defined" (pp. 4-5), because the learning content and processes are not fully defined at the beginning of a project, but rather evolve as the learning takes place. As well, the learners themselves take a role in deciding the content of the learning and the type of activities that take place. That is, learning is facilitated and supported and not dictated by the instructional designer. This is consistent with Winn's (1991) view that the choice of instructional method improves as more is known about the context of the learning. However, Jonassen (1994) insists that constructivist learning environments are "not the unregulated, unsupported, anarchic, sink-or-swim, open-discovery learning cesspools that many fear" (p. 35). Consequently, Jonassen (1999) proposed principles on which to base constructivist learning environments so they have a structure and purpose, but also have the flexibility to respond to the context and learner needs (see section 2.3).

The work of David Jonassen is featured throughout this literature review. He is the author and co-author of many articles and books, and is cited throughout contemporary literature on the constructivist perspective. The principles that Jonassen (1999) proposed to guide the development of constructivist learning environments were published in a book edited by Reiguleth (1999) that described a range of instructional designs. Jonassen's contribution from a constructivist perspective stood alone in a book otherwise made up of instructional designs from the objectivist perspective. The difference between a constructivist learning environment and objectivist instruction is that "the problem drives the learning" (Jonassen, 1999, p. 218). In objectivist instruction, the problem merely provides an example of how particular principles and concepts may be applied, such as a mathematics problem in a text book. On the other hand, a constructivist learning environment is characterised by:

1. rich contexts;
2. authentic tasks;
3. collaboration for the development and evaluation of multiple perspectives;
4. an abundance of tools to enhance communication and access to real-world examples and problems;
5. reflective thinking;
6. modelling of problem solving by experts in the content domain; and
7. apprenticeship mentoring relationships to guide learning (Duffy & Bednar, 1992, p. 132).

A constructivist learning environment is made up of learners and a place where those learners use information and tools to accomplish tasks and interact with others (Wilson, 1995a). Instructional designers must understand how learners think and learn (Perkins, 1992), as well as the following principles that underlie the cognitive processes involved:

1. Understanding evolves continuously;
2. Individuals must assume greater responsibility for their learning;
3. Learners make, or can be guided to make, effective choices;
4. Learners perform best when varied/multiple representations are supported;
5. Knowledge is most meaningful when rooted in relevant, scaffolded contexts;
6. Understanding is most relevant when rooted in personal experience;
7. Reality is personally constructed via interpretation and negotiation; and
8. Understanding requires time (Hannafin & Land, 1997, pp. 183-186).

Technology can support the cognitive processes in a number of ways. First, computers now available at home and at school are powerful and "can manipulate a range of variables in order to represent the natural complexity in a real world system" (Jonassen, 1996, p. 50). For example, students can manipulate the variables in a simulation of a weather system and identify changes in outcomes. Second, in attending to ill-structured and complex problems, linear support mechanisms for learning such as books are not as effective as the random access afforded by a computer and access to the Internet (Spiro & Jehng, 1990). For example, students attempting to derive meaning from a Shakespearean play can read the text, view a performance of the play, replay scenes, and search for perspectives on the play. Third, technology can facilitate forums in which learner selected topics are investigated and knowledge constructed through negotiation, higher order thinking, and elaboration (Jonassen, 1993). McLellan (1996), though, warns about attempting to fit an existing multi-media program to a learning situation because few "exemplify situated cognition by incorporating reflection, collaboration and engagement" (p. 8). The onus is therefore on the instructional designer to be creative in applying technology as a tool so that learning is supported in a way that is consistent with the underlying principles described above.

Jonassen (1993) identifies other issues that must be considered by the instructional designer. For example, learners need to develop appropriate study skills if they are to take greater responsibility for their learning. Computers can become a powerful distraction in the form of games, chat rooms, and non-productive searches. Learners, particularly older ones, may not be familiar with the strategies of learning in this way and may need time for adjustment. Instructors also may not be familiar with these strategies and may find it difficult to release control of aspects of the learning process. Reflection is a key element in the process but may be poorly addressed or learners may not have the skills to reflect in deep and meaningful ways. Finally, the outcomes are often difficult to measure. This concern is addressed in chapter three.

2.3 Instructional Design of the Project

At some point the theory about what constitutes a constructivist learning environment has to be condensed into a model that a project designer can work with to establish a constructivist learning environment. The model adapted from the principles proposed by Jonassen (1999) has five elements. The first element includes the issue and the context of the learning. Jonassen (1999) proposes that the issue that is driving the learning is presented to the learners in a way that stimulates their interest, or even perturbs the learner. Video scenarios are recommended, particularly ones that tell a story with characters and a series of events. The context of the learning has two parts. The performance environment is the first part and is concerned with the "physical, socio-cultural, and organizational feature of the workplace surrounding the problem . . . physical resources . . . [and] the history of the setting" (p. 220). The community of practice is the second part and is concerned with the "values, beliefs, sociocultural expectations, and customs" (p. 220) as well as the "skills and performance backgrounds" (p. 220) of the learners. These factors are considered by the project designer in the initial phase of the project, and information about the context will continue to be gleaned and taken into account throughout the lifetime of the project.

The second element of a constructivist learning environment involves related cases. Cases of the issue being resolved by expert practitioners facilitates learner understanding of the problem and supports case-based reasoning, a concept and process described later in the literature review. The cases also enhance cognitive flexibility by providing multiple perspectives or interpretations of practices. The third element is the information resources that learners access "to construct mental models and formulate hypotheses" (Jonassen, 1999, p. 225). Information has to be readily available to the learner at the moment in learning when it is needed. The fourth element is the tools that learners use to support their cognitive processes and to facilitate communication and collaboration. The fifth element concerns the issues that affect the implementation of the project including the social and contextual support for learners. Table 2.1 is a summary of the model adapted from the principles proposed by Jonassen (1999) that will be applied as the instructional design for the *ePortfolio Project*.

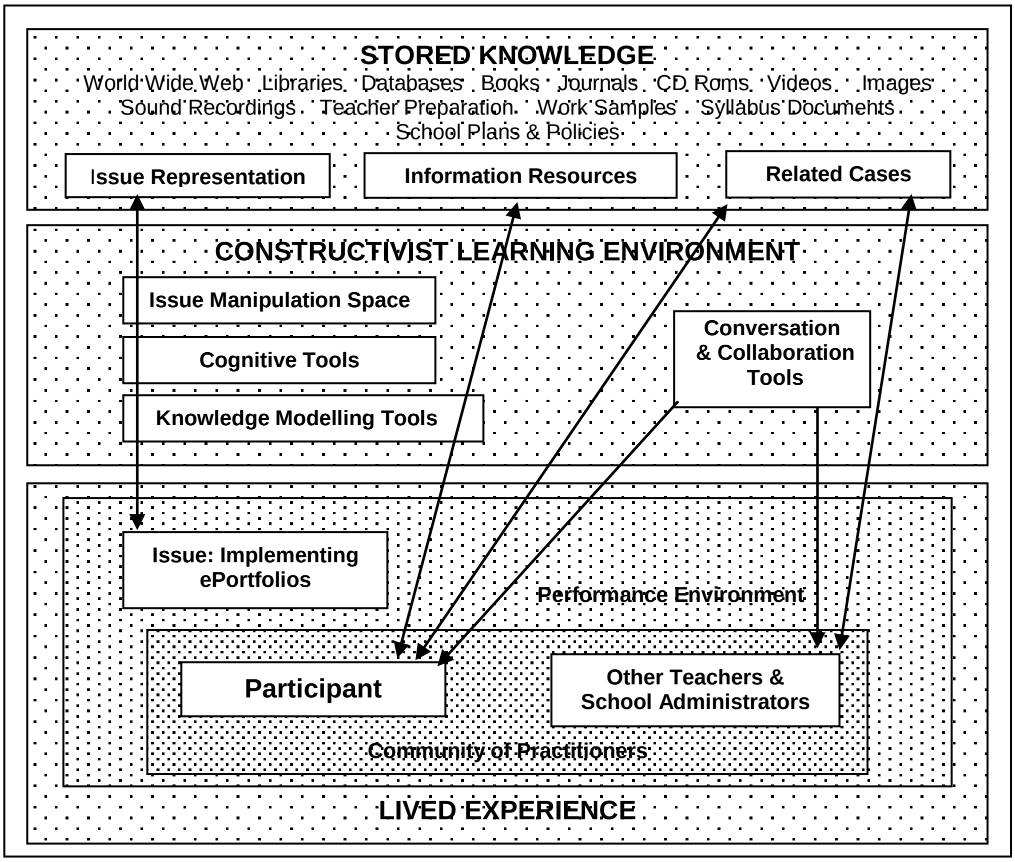
Table 2.1: Elements of a Constructivist Learning Environment

Instructional-Design Features	Purpose
1. The Issue	To establish the focus and context of the constructivist learning environment.
1.1 Issue Context	To describe the context in which the issue occurs.
1.1.1 Performance Environment	To describe physical, socio-cultural, and organizational features of the workplace.
1.1.2 Community of Practitioners	To describe the values, beliefs, socio-cultural expectations, customs, skills and performance backgrounds of the learners.
1.2 Representation of the Issue	To perturb the learner.
1.3 Issue Manipulation Space	To provide the objects, signs, and tools required for the learner to manipulate the environment.
2. Related Cases	To scaffold student memory and to enhance cognitive flexibility through multiple perspectives, themes or interpretations.
2.1 Case Library	To provide access to a set of related cases.
2.2 Case Based Reasoning	To apply the principles of case based reasoning.
3. Information Resources	To provide learner-selectable information just-in-time to support learners in constructing mental models and formulating hypothesis.
4. Tools	To support learning.
4.1 Cognitive (Knowledge-Construction) Tools	To provide intellectual devices so that the leaner may visualize, organize, automate or supplant thinking skills.
4.2 Static & Dynamic Knowledge Modelling Tools	To support performance and information gathering.
4.3 Conversation and Collaboration Tools	To facilitate communication between learners
5. Social and Contextual Support	To describe the physical, organisational, and cultural factors affecting implementation.

(Adapted from Jonassen, 1999, pp. 220-236)

Salomon (1996) makes an important point that “the totality of a learning environment is more than the sum of its components” (p. 367). That is, a constructivist learning environment is a system. This is an important point in considering the evaluation of the *ePortfolio Project*, as described in chapter three, because attention will need to be given to the assessment of the project as a whole as well as discrete activity. The basis for the evaluation of the project is the Professional Development Framework (see appendix B), which strengthens this view of the constructivist learning environment as a system. A diagrammatic overview of the system designed to support learning in the *ePortfolio Project* is provided in Figure 2.1.

Figure 2.1: Overview of the Project



(Otto, 2008)

Figure 2.1 demonstrates how the constructivist learning environment links the participant, who operates in the real world of lived experience, with a store of knowledge that will support them as they experiment with new experiences. The constructivist learning environment takes the role of facilitation, providing the participant with tools to support cognitive processes and to collaborate with other participants. Participants may manipulate the issue within the environment, making adjustments and adaptations to the stored knowledge and cases of other ePortfolios to meet the needs of their own context. Each of the interactions between the elements in Figure 2.1 can be supported by technology, e.g., access to information sources and cases, collaboration forums, and tools to model knowledge.

2.3.1 Needs and Task Analysis

The literature review provides information for both a needs analysis and a task analysis. A needs analysis identifies discrepancies between the capability of the learners and the intended outcomes of the project, while a task analysis identifies what needs to be learned in order to achieve those outcomes (Jonassen, Tessmer, & Hannum, 1999). Regardless of whether the instructional design is based on objectivist or constructivist theories, Jonassen et al. (1999) believe task analysis is “the single most important component process in the instructional design process” (p. ix). Task analysis “is a process of analysing and articulating the kind of learning that you expect learners to know how to perform . . . [to develop] a framework for building an instructional design or a learning environment” (Jonassen et al., 1999, p. 3). Instructional designers perform task analysis in order to determine:

1. the goals and objectives of learning;
2. the operational components of jobs, skills, learning goals or objectives;
3. what type of knowledge characterizes the tasks;
4. which tasks have the highest priority;
5. the sequence that the instruction should follow;
6. how to select or design instructional activities that foster learning;
7. how to select appropriate media; and
8. how to assess a learner’s performance (Jonassen et al., 1999, p. 3).

Jonassen et al. (1999) go on to say that there are five general classes of task analysis, and each is addressed in the literature review:

1. Job analysis describes the behaviours involved in performing a job;
2. Learning analysis describes the way learners process information as they perform tasks;
3. Cognitive task analysis describes the actions, knowledge and thinking that learners engage in when performing some task;
4. Activity analysis analyses how people perform in natural, everyday settings; and
5. Content analysis [is] used to break down subject matter content into discrete constructs and their relationships (p. 6).

The needs and task analysis undertaken in the literature review is organised around the five elements of a constructivist learning environment, i.e., the issue, related cases, information resources, tools, and social and contextual support (see Table 2.1).

2.4 The Issue

The issue in the professional development project in this study is the implementation of ePortfolio frameworks suitable for primary and secondary classrooms. There are five sections to the investigation of the issue. The first section is an investigation of the literature relating to ePortfolios to understand the "the nature of what is to be learned" (Reigeluth, 1999, p. 9). Information from this section will contribute to a booklet distributed to participants in order to support them in their learning. The other sections relate to the performance environment, the community of practice, the representation of the issue, and the issue manipulation space.

Two authors who are cited throughout this review of ePortfolios are Helen Barrett from the University of Alaska and Elizabeth Hartnell-Young from the University of Melbourne. These authors are recognized in contemporary literature as innovators in the area of ePortfolios, and the researcher attended their presentations at several national conferences. One of those conferences was organised by Elizabeth Harnell-Young and was the first national conference to be held in Australia on ePortfolios.

2.4.1 ePortfolios

Along with providing new opportunities for learning, technology is changing the expectations of teachers in the preparation of students for their future roles in society (Hartnell-Young & Morriss, 1999). According to Hartnell-Young and Morriss (1999), "in the digital age, valuing individual capabilities and talents is becoming more important that ever . . . [and] individuals are becoming increasingly responsible for managing their own career paths" (p. 6). In order to showcase their capabilities and talents, job seekers are using the latest multimedia applications of technology to prepare their portfolios, which in this format are called *ePortfolios*. These professional looking presentations may be placed on national and state databases in Australia and overseas to facilitate access by potential employers as records of people's achievement and worth as they move within and between jobs.

In recognition of this trend, tertiary institutions are implementing ePortfolio frameworks as a showcase of student achievement at the end of programs, as well as a tool to support learning during programs. For example, an ePortfolio project at the Queensland University of Technology (2005a) has been "designed to enhance the learning process and assist students with the critical transition from university to graduate employment. It provides an environment in which students can document and present different aspects of their academic, professional and personal development" (para. 1). As a result, students will:

1. take a more holistic view of their learning by reflecting on experiences drawn not only from their studies, but from all areas of their lives;
2. recognise the variety, depth and ongoing development of their knowledge and abilities;
3. increase their confidence in themselves as emerging professionals;
4. identify skill areas in need of improvement;
5. [be encouraged in] reflective thinking and the development of lifelong learning skills,

6. build a comprehensive repository of information;
7. [gain] a better understanding of the connection between their coursework and the graduate capabilities they are expected to develop;
8. review and refine their educational goals; and
9. take a more active role in their learning and development (paras. 4-7).

Furthermore, the Queensland University of Technology (2005b) website advises:

> Employers were increasingly looking beyond academic accomplishments in selecting staff . . . [and that] it allows the identification of important attributes that don't necessarily show through in a grade from a particular subject . . . things like teamwork, communication skills, critical thinking, problem solving, leadership and a few others (para. 8).

As more tertiary institutions adopt ePortfolio frameworks as an integral part of teacher education programs, greater numbers of teacher graduates will be entering the teaching profession with personal knowledge of ePortfolios and the role they play in learning and showcasing student achievements. These beginning teachers will have the skills and vision to implement ePortfolio frameworks in their classrooms. Experienced teachers and school administrators in primary and secondary schools are already recognising the value of ePortfolios, and are developing their own frameworks for ePortfolios to meet their particular needs (Queensland University of Technology, 2005b). ePortfolios may be adapted to any level of education. Hartnell-Young (2004) observed children in Finland as young as kindergarten level working on their ePortfolios.

2.4.2 ePortfolios Defined

An ePortfolio may be defined as "a purposeful collection of work, captured by electronic means that serves as an exhibit of individual efforts, progress, and achievements in one or more areas" (Wiedmer, 1998, p. 586). ePortfolios have evolved from the well established practice of collecting student work in paper based portfolios (Gibson & Barrett, 2002). Because technology is now readily available in schools, students and teachers can convert information from any source into "digital bits," including script, sounds, graphics, still images, and video. Digitised information, called a "digital artefact" (Tosh & Werdmuller, 2004a, p. 2) is able to be stored, transmitted, edited, or mixed to create multimedia presentations (Negroponte, 1995). An ePortfolio may be made up of a variety of multimedia presentations, along with other artefacts and student reflections on their learning.

The terms *electronic* and *digital* portfolio are often used synonymously. However, all of the contents of a digital portfolio are in digital format, while an electronic portfolio or ePortfolio may contain some material in analogue format, for example a VHS videotape (Barrett, 2001). The term *ePortfolio* will be used throughout this paper for the purpose of consistency. The term *portfolio* will be used to refer to paper based portfolios, though many of the principles of creating paper based portfolios apply to ePortfolios (Barrett, 2003).

Technology plays a central role in constructing ePortfolios by enhancing the five processes that were developed for creating paper based portfolios (see Table 2.2). Less storage space is needed than paper based portfolios, computer files can be easily copied for back-up and distribution purposes and are portable and accessible, and hyperlinks between artefacts and goals can readily provide evidence that standards are being met (Barrett, 2001).

Table 2.2: Technology Supported Portfolios

Traditional Portfolio Processes	Technology allows the addition of
1. collecting;	1. archiving;
2. selecting;	2. linking/thinking;
3. reflecting;	3. storytelling;
4. projecting; and	4. collaborating; and
5. celebrating.	5. publishing.

(Barrett, 2004a, p. 10)

There are three types of ePortfolios, and an ePortfolio may have elements of more than one type:

1. formative (a learning tool for the user);
2. summative (a monitoring tool, formal evaluation process); and
3. marketing (a mechanism for employment opportunities) (Hartnell-Young & Morriss, 1999; Tosh & Werdmuller, 2004a).

While all three types will be included in the description of the issue, discussion will be limited to applications in primary and secondary schools. In this context, marketing or showcase ePortfolios are not necessarily created for employment purposes. For example, an ePortfolio may become a marketing type when used by a primary or secondary student to celebrate their achievements, e.g., by posting a completed project to the school's Intranet. School leavers, on the other hand, may produce a marketing ePortfolio as a culminating activity for the purpose of gaining employment or entry to tertiary education, e.g., an art portfolio required for entry to a fine arts program.

It will be argued in this discussion that the implementation of an ePortfolio framework in primary and secondary classrooms is an active response to meeting the present and future needs of students, as well as encouraging teachers and students to engage with technology and develop requisite skills. Student participation in creating an ePortfolio provides a purpose for using technology in classrooms that can be applied to most, if not all activities. An ePortfolio framework can accommodate and encourage new approaches to assessment and reporting, because an ePortfolio has the capacity to provide a rich picture of a student's abilities and to demonstrate the growth of a student's learning over time (Barrett, 2003). An ePortfolio can be likened to:

1. a mirror (captures the reflective nature of the portfolio, allows students to "see" themselves over time);
2. a map (creating a plan and setting goals); and
3. a sonnet (provides a framework . . . the contents can showcase creativity and diversity, structure supports process but does not guarantee results) (Barrett, 2003, p. 3).

Of particular interest to this study is the potential for ePortfolios to change teaching practice, a theme that will be developed in the course of this investigation.

2.4.3 Old and New Pedagogies

Teachers need to be aware of the philosophical and practical differences in teaching with technology so they can draw on this information during reflection processes. The introductory discussion about exemplary teaching with technology in chapter one requires further clarification as part of the needs and task analysis.

Scheerens and Bosker (1997) conducted a literature search and isolated what they believe to be the principles of effective teaching:

1. effective learning time, e.g., time on task;
2. structured instruction, e.g., well-prepared and well-controlled teaching;
3. independent learning, e.g., use of meta-cognitive skills and learning embedded in authentic assignments and 'real life' situations;
4. differentiation, e.g., instruction that is adaptive to the specific needs of subgroups of pupils; and
5. reinforcement and feedback e.g., cognitive and motivational implications (pp. 125-134).

Hill and Crévola (1997) also conducted a literature search and settled on the somewhat similar principles of:

1. high expectations of student achievement;
2. engaged learning time; and
3. focused teaching that maximises learning within each student's 'zone of proximal development' (Vygotsky, 1978) (p. 2).

If these principles remain constant regardless of whether or not technology is used to support learning, then it is necessary to look elsewhere to understand the role of technology in education.

Loveless et al. (2001) considered differences in the views of knowledge between those who used print based material and those who used technology. They concluded that print based information has reinforced a view of knowledge as being static with a pedagogical focus on "the finality of a text, image or sound" (p. 74). Conversely, information presented using technology is more fluid, facilitating a mix of sounds and images along with the capacity to be revised. Teachers learn repertoires of classroom practice to present knowledge and to develop children's skills. Technology enhances teachers' repertoires through "text processing tools; instructional software; analytic and information tools; programming and operating systems; games and simulations; graphics and operating tools; communications; and multimedia" (Hadley & Sheingold, 1993, p. 270). As a consequence, the management of knowledge in print based pedagogy is different from the management of knowledge in technology based pedagogy, as described in Table 2.3.

Table 2.3: Views of Knowledge in Old and New Pedagogies

	Old pedagogy		New pedagogy
1.	Know as much as there is in the book and as much as the teacher says;	1.	Use strategies to decide what is worth knowing in the head and what needs to be stored: not all information should be learned;
2.	Teacher uses lecture to pass on his or her knowledge to the students;	2.	Teacher helps students access, select, evaluate, organize, and store information coming from a wide range of sources;
3.	Students dump information or organize information by categories;	3.	Students organize by categories and according to a range of perspectives;
4.	Students put information on paper for the teacher to see or the paper is posted on the wall for the school to see;	4.	Students write to disks or publish on the web for parents, relatives and a wider audience to see;
5.	Paper journals and books as the source of knowledge;	5.	Online journals and books replacing established protocols for writing and publishing;
6.	Texts are set;	6.	Texts are editable;
7.	Students have limited choice of sources;	7.	Students' personal choices are expected;
8.	Goals using technology are not integrated or not present;	8.	Integrating classroom goals with the power of technology;
9.	Intellectual products such as reports are fixed on paper and finished;	9.	Intellectual products are revisable living documents subject to addition, subtraction and change;
10.	Report form texts with no connection to the persons producing them;	10.	A range of creative multi-sensory electronic forms, such as web pages, with movement, charts, and pictures with personal connections;
11.	Neat hand-written reports with every appearance of being produced by children;	11.	Intellectual product has a professional look printed with colour and attention to design;
12.	Students hide papers from each other, allowing only teacher to read the paper;	12.	Students exchange tips about editing and revising their products;
13.	Texts are brought home and shared with parents or others in person;	13.	Teacher asks students to share their products with friends and relatives in an attachment or on the web as a way to revise and publish for an audience;
14.	Knowledge is displayed in one form only;	14.	Knowledge is written in a range of forms such as web pages, paper reports, PowerPoint presentations, by cutting and pasting the information into different programs;
15.	Knowledge is displayed only in a linear form; and	15.	Knowledge is displayed in linear and hypertext formats. Class discusses advantages of each; and
16.	Students who don't use technology at a young age don't have facility with electronic tools.	16.	Students use technology early and often, and discuss strategies for using tools.

(Loveless et al., 2001, pp. 80-81)

The strategies described in the new pedagogy are consistent with the implementation of ePortfolios. For example, teachers assist students to select and evaluate items for their ePortfolio, the product is professional looking, ePortfolios encourage the sharing of learning, and students are using editable texts.

The effective implementation of ePortfolios can also be an indicator of a teacher's confidence in using technology and their progress in implementing technology in the classroom (Barrett, 2004b). Ertmer et al. (2000) adapted the work of Grabe and Grabe (1996) to describe the attributes of classrooms that have made the transition from a traditional to an integrated setting (see Table 2.4).

Table 2.4: Attributes of Traditional and Integrated Classroom Environments

Classroom Practice		Traditional Setting	Integrated Setting
1.	Classroom Focus	Teacher centered (didactic)	Learner centered (interactive)
2.	Teacher Role	Present information Manage classroom	Guide discovery Model active learning Collaborator (sometimes learner)
3.	Student Role	Store information	Create knowledge Collaborator (sometimes expert)
4.	Curricular - Depth Characteristics	Breadth Fact retention Fragmented knowledge and disciplinary separation	Depth Application of knowledge Integrated multidisciplinary themes
5.	Classroom Social Organization	Independent learning Individual responsibility for entire task	Collaborative learning Social distribution of thinking
6.	Assessment Practices	Fact retention Product oriented Traditional tests Norm referenced	Applied knowledge Process oriented Alternative measures Criterion referenced
7.	Role for Technology	Drill and practice Direct instruction Programming	Exploration and knowledge construction Communication (collaboration, information access, expression)
8.	Technology Content	Basic computer literacy with higher level skills building on lower level skills	Emphasis on thinking skills and application

(Ertmer et al., 2000, p. 33)

Crane (2000) also investigated the differences between traditional instruction and instruction enhanced by technology. Her list in Table 2.5 is similar to the one above, but is simpler in its presentation.

Table 2.5: Instruction Types

Traditional Instruction		Technologically Enhanced Instruction	
1.	Linear progression	1.	Multipath progression
2.	Teacher centered	2.	Student centered
3.	Literal thinking	3.	Critical thinking
4.	Single medium	4.	Multisensory
5.	Isolation	5.	Cooperation
6.	Teacher delivered	6.	Teacher facilitated
7.	Passive learner	7.	Active learner
8.	Structured	8.	Exploratory
9.	Predetermined learning style	9.	Preferred learning style
10.	Classroom interaction	10.	Real world interaction

(Crane, 2000, p. 8)

Morrison, Lowther, and DeMeulle (1999) highlight the role of technology in promoting collaborative learning. Working as part of a team, working to achieve a vision, communicating with others, and working productively with others are skills that teachers need to model and incorporate in teaching strategies. Children need to learn how responsibilities may be divided and why they should accept responsibility for other learners, and in the process become peer tutors as they learn from each other.

Cuttance (2001b) observed innovative practices in schools and concluded that technology affects the learning environment in two ways. First order effects are those outcomes relating to improvements in children's motivation and learning, while second order effects refer to enhanced opportunities for new environments and collaborative learning more closely resembling future roles in work. Teachers in the Innovation and Best Practice Project (IBPP) were observed using technology as tools to develop skills, to improve learning efficiency, and to support approaches to teaching associated with constructivist-compatible theories of learning. Outcomes included:

1. enhanced social competencies through cooperative and collaborative learning;
2. enhanced time management skills;
3. acceptance of responsibility for own learning;
4. mastery of curriculum-based learning outcomes;
5. improvements in learning against pre-specified outcomes criteria;
6. increased use of, and enhanced capacity to use, meta-cognitive and higher order problem solving skills;
7. improvement in ICT skills;
8. improved results in standardised state-wide literacy and numeracy tests; and
9. reduced level of ‘unsatisfactory’ progress (Cuttance, 2001a, p. xviii).

From their observations of classrooms, Sandholtz and Ringstaff (1996) concluded that children who had previously been considered slow or reluctant responded to the alternative means of displaying their abilities afforded by technology. Cuttance (2001a) observed innovative practices in schools, and concluded that teachers derive satisfaction from witnessing improvements in children’s learning and classroom management practices.

Technology also facilitates new types of interactions between children and teachers and extends learning beyond the physical space of a school and the time restrictions of a school day (Loveless et al., 2001). For example, children may email a document to a teacher who returns it with comments added. Conversely, a teacher’s notes, resources, and assignment tasks may be emailed to a child or accessed via the Internet, and then reformatted to suit individual preferences. Children in the one class may be involved in different activities at the same time, and may work at their own pace with an interactive CD-ROM. It was these types of enhancements in the efficiency and effectiveness of learning that impressed Cuttance (2001a) in the IBPP.

Those new to teaching with technology tend to focus on management issues rather than pedagogical issues (Sandholtz & Ringstaff, 1996). In the ACOT project, technology was observed to provide new opportunities for children to misbehave and new approaches to classroom management had to be investigated and implemented (Sandholtz, Ringstaff, & Dwyer, 1996). For example, software was pirated, copied work was more difficult to detect because it was not handwritten, and teachers could not preview inappropriate emails. Plagiarism was easier to commit and more difficult to detect because of multiple and anonymous sources. Children brought down networks and entered confidential databases. An unintended consequence of using technology was that children could not tell how they arrived at answers. That is, they could not articulate processes. Furthermore, children refused to work in any other way but with a computer and new excuses were created for not doing homework. Working with technology did not fit well with traditional school time periods, and children were reluctant to leave an activity when the bell had rung. Sandholtz and Ringstaff (1996) reported that teachers were also concerned about the effect on learning of movement about the classroom and the noise of chatter, computers, and printers. Many of these issues were resolved through experience, rearranging the classroom and time periods, retraining children, and having different expectations of children.

However, Sandholtz and Ringstaff (1996) observed in the ACOT project that “new patterns of teaching and learning emerged” (p. 285) when teachers adopted technology in their practices. They noted that change was incremental and that teachers had to address inconsistencies. For example, teachers took time to accept that computer based activities actually represented real learning. As well, new modes of assessment were necessary to evaluate new learning behaviours and outcomes. That is, pedagogy, the curriculum, and assessment had to be aligned as recommended by Hill and Crévola (1997), Crowther (1999), Education Queensland (2001a), Cuttance and Stokes (2001a), and Luke (in Hunter, 2000-2001).

ePortfolios support the engagement of teachers and students with technology in three ways (O’Rouke, 2001). In order to build an ePortfolio, teachers and students have to first learn how to use technology, and second use technology in practical and meaningful ways. For example, they use technology to research, to organise information, to write, and to collaborate with others. The third way concerns multi-literacies, as teachers and students manipulate different media formats. For example, they have to understand different media and reflect on its content and purpose as well as its effectiveness. Implemented as a whole school project, ePortfolios provide an opportunity for school leaders to engage in an unprecedented renewal of teaching and learning. A school culture can be built around ePortfolios, which "is the most critical element in making the [ePortfolio] a tool for reform rather than a technological version of a set of folders" (Niguidula, 1997, p. 26).

2.4.4 Levels of Change in Teaching Practices

The discussion about teaching practices has so far been limited to describing both ends of a continuum, with traditional approaches at one end, and constructivist compatible approaches at the other. The discussion has recognised that teachers adopt practices derived from both approaches depending on classroom constraints and the goals of instruction. Tucker and Batchelder (2000) believe this reflects the nature of teaching, but suggest that teachers need to be aware of which approach they are using and understand how to be effective no matter which approach is used.

Change in teaching practices is likely to be incremental. By understanding the increments, school administrators, teachers, and the designers of professional development programs can determine where current practices lie, and visualise what needs to be achieved in order to move on to the next increment (Otto, 2003). For example, Moersch (1996-97) developed an eight level continuum of changes observed when a curriculum enriched by technology is implemented (see Table 2.6). The purpose of the continuum is to guide decision making about a school's curriculum relating to "concept/process based instruction, authentic uses of technology, and qualitative assessment" (Moersch, 1995, p. 41). Moersch (1996-97) was also concerned about the efficient use of technology in supporting "higher order thinking skills (e.g., interpreting data, reasoning, solving real world problems)" (p. 52).

Table 2.6: Level of Technology implementation (LoTi)

0 Nonuse: A perceived lack of access to technology-based tools or a lack of time to pursue electronic technology implementation. Existing technology is predominately text-based (e.g., ditto sheets, chalkboard, overhead projector).
1 Awareness: The use of computers is generally one step removed from the classroom teacher (e.g., it occurs in integrated learning system labs, special computer-based pull-out programs, computer literacy classes, and central word processing labs). Computer-based applications have little or no relevance to the individual teacher's instructional program.
2 Exploration: Technology-based tools serve as a supplement (e.g., tutorials, educational games, simulations) to the existing instructional program. The electronic technology is employed either for extension activities or for enrichment exercises to the instructional program.
3 Infusion: Technology-based tools including databases, spreadsheets, graphing packages, probes, calculators, multimedia applications, desktop publishing, and telecommunications augment selected instructional events (e.g., science kit experiments using spreadsheets or graphs to analyze results, tele-communications activities involving data sharing among schools).
4 Integration (mechanical): Technology-based tools are mechanically integrated, providing a rich context for students' understanding of the pertinent concepts, themes, and processes. Heavy reliance is placed on prepackaged materials and sequential charts that aid the teacher in the daily operation of the instructional curriculum. Technology (e.g., multimedia, telecommunications, databases, spreadsheets, word processing is perceived as a tool to identify and solve authentic problems relating to an overall theme or concept.
5 Integration (routine): Teachers can readily create integrated units with little intervention from outside resources. Technology-based tools are easily and routinely integrated, providing a rich context for students' understanding of the pertinent concepts, themes, and processes. Technology (e.g., multimedia, telecommunications, databases, spreadsheets, word processing) is perceived as a tool to identify and solve authentic problems relating to an overall theme/concept.
6 Expansion: Technology access is extended beyond the classroom. Classroom teachers actively elicit technology applications and networking from business enterprises, governmental agencies (e.g., contacting NASA to establish a link to an orbiting space shuttle through the Internet), research institutions, and universities to expand student experiences directed at problem solving, issues resolution, and student activism surrounding a major theme or concept.

7 Refinement: Technology is perceived as a process, product (e.g., invention, patent, new software design), and tool for students to use in solving authentic problems related to an identified real-world problem or issue. In this context, technology provides a seamless medium for information queries, problem solving, and product development. Students have ready access to and a complete understanding of a vast array of technology-based tools to accomplish any particular task.

(Moersch, 1996-97, p. 53)

Moersch (1996-97) points out that the LoTi continuum takes the emphasis away from concerns about the type and quality of technology, student/computer ratios, networking, and other elements of infrastructure. Similar to observations by Cuttance (2001b) in the IBPP, the focus is on what teachers are doing with what they have. The other feature that makes the LoTi continuum relevant to this study is that Moersch (1995) links the level of technology implementation to teacher self-efficacy and willingness to accept change as discussed in section 1.4. That is, “individuals with a low level of self-efficacy will often choose a level of innovation that they believe they can handle, which may or may not be the most effective option” (Moersch, 1995, p. 40).

Continuing on from his earlier work in developing the LoTi continuum that focused on curriculum implementation, Moersch (1996-97) felt it would be useful to measure changes in instructional practices as “instructional focus shifts from a teacher-centered orientation to a learner-centered orientation” (p. 52). The Levels of Instructional Practices framework (Moersch, 1996-97) is a scale of three levels for each of the four areas of materials, activities, strategies, evaluation, and technology (see Table 2.7).

Table 2.7: Levels of Instructional Practices

		Level 1	Level 2	Level 3
1.	Learning Materials	Organized by the content; heavy reliance on textbook and sequential instructional materials	Emphasis on science kits; hands-on activities (e.g., AIMS, FOSS)	Determined by the problem areas understudy; extensive and diversified resources
2.	Learning Activities	Traditional verbal activities; problem-solving activities	Emphasis on student’s active role; problem-solving activities with little or no context; verification labs using science kits and related hands-on experiences	Emphasis on student activism and issues; investigations and resolutions; authentic hands-on inquiry related to a problem under investigation; focus on experiential learning
3.	Teaching Strategy	Expository approach	Facilitator; resource person	Colearner or facilitator
4.	Evaluation	Traditional evaluation practices, including multiple choice, short answer, and true/false questions	Multiple assessment strategies, including performance tasks and open-ended and problem-based questions	Multiple assessment strategies integrated authentically throughout the unit and linked to the problem/theme/topic; portfolios, open ended questions, self-analysis, and peer review
5.	Technology	Computer-based drill and practice programs (e.g., traditional integrated learning systems [ILS] computer games); little connection between technology use and overall theme or topic	Technology integrated into isolated hand-on experiences (e.g., the tabulation and graphing of data to analyse a survey or experiment); information searches using telecommunications	Expanded view of technology as a process, product, and tool to find solutions to authentic problems, communicate results, and retrieve information (e.g., use of Spreadsheets, graphs, probes, databases, CD-ROM-based simulations, and telecommunications)

(Moersch, 1996-97, p. 54)

From their observations, Sandholtz and Ringstaff (1996) identified five stages in the changes teachers made to their instructional strategies (see Table 2.8). These stages demonstrate the higher levels of creativity and innovation that are demanded of teachers as they develop sophistication in technology integration.

Table 2.8: Changes in Instructional Strategies

Stage 1: Entry
a. little or no experience with computer technology and demonstrated little inclination to significantly change their instruction
b. focused on changes in the physical environment and typical first-year-teacher problems such as discipline, resource management, and personal frustrations
c. began using resources but simply replicated traditional instructional and teaming activities

Stage 2: Adoption
a. concerns shifted from connecting the computers to using them
b. adopted the new electronic technology to support established text-based drill-and-practice instruction
c. continued to rely on whole-group lectures, recitation, and individualized seat work

Stage 3: Adaptation
a. changes in the efficiency of the instructional process
b. incorporated technology in their instruction
c. reports focused on ways students' productivity increased

Stage 4: Appropriation
a. understand technology and used it effortlessly as a tool to accomplish real work
b. roles began to shift and new instructional patterns emerged
c. altered master schedule
d. reflect on teaching, question old patterns, speculate about causes behind the changes

Stage 5: Invention
a. continuing development by teachers and new learning environments
b. implement an integrated curriculum
c. make balanced and strategic use of both direct teaching and project-based teaching
d. integrate alternative modes of student assessment

(Sandholtz & Ringstaff, 1996, p. 286)

From another perspective, Hord (1987) built on the earlier work of Gabriel (1957), Fuller (1969), and Hall and Rutherford (1976) to develop a model of the stages learners may go through as a new concept grows from awareness to being an integral part of practice. As with the three previous tables, the Stages of Concern Questionnaire (SoCQ) (Hord, 1987) is useful in understanding not only how far learners have progressed in adopting new approaches, but also how much progress is possible. The SoCQ has seven stages:

1. Awareness: I am not concerned about it (the innovation);
2. Informational: I would like to know more about it;
3. Personal: How will using it affect me?
4. Management: I seem to spending all my time getting material ready;
5. Consequence: How is my use affecting students?
6. Collaboration: I am concerned about relating what I am doing with what other instructors are doing; and
7. Refocusing: I have some ideas about something that would work even better (p. 101).

2.4.5 ePortfolios as a Continuum

The previous sections describe how teaching practices lie on a continuum and levels of technology implementation are incremental. ePortfolios also lie on a continuum and the development of ePortfolios is also incremental. Teacher centred summative ePortfolios are on one end of the continuum, while student centred formative ePortfolios lie at the other end (Barrett, 2004a). These types of ePortfolios have their origins in traditional or positivist and constructivist philosophies respectively, and have different purposes and content, i.e., selected items, as detailed in Table 2.9 (Paulson & Paulson, 1996a). The continuum is also aligned with two of the three types ePortfolios described earlier (Hartnell-Young & Morriss, 1999; Tosh & Werdmuller, 2004a). That is, teacher centred summative or positivist ePortfolios are used for monitoring student progress as part of a formal evaluation process. They are a record of students' achievements that makes use of digital recording, storage, and presentation without changes to teaching or learning or input from the students themselves. Conversely, a student centred formative or constructivist ePortfolio acts as a learning tool for the user. Student centred ePortfolios allow students to make choices in content and presentation. Risk taking is required of teachers because there is less control over curriculum content and processes, and students have a role in negotiating their learning and making choices. Changes to teaching and learning occur because different conversations take place between teachers and students and a different approach is taken to activities (Paulson & Paulson, 1996a; Barrett, 2004a; Tosh & Werdmuller, 2004b).

Table 2.9: Positivist and Constructivist ePortfolios

Positivist ePortfolios	Constructivist ePortfolios
Purpose	
1. Assess learning outcomes (generally externally defined);	1. Portfolio is a learning environment in which the learner constructs meaning;
2. Meaning is constant across users, context, and purposes; and	2. Meaning varies across individuals, over time, and with purpose;
3. Receptacle for examples of student work used to infer what and how much learning has occurred.	3. Summation of individual portfolios would be too complex for normative description; and
	4. Record of the processes associated with the learning itself.
Items	
1. Selected items reflect outside standards and interests;	1. Selected items reflect learning from the student's perspective;
2. Includes tests or test-like representational situations designed by others; and	2. Not appropriate to include tests or test-like representational situations; and
3. Psychometric standards of reliability emphasized in judgements.	3. Because idiosyncratic standards play an important role, less emphasis on consistency of judgements.

(Paulson & Paulson, 1996a, pp. 22-23)

ePortfolios that lie along the continuum may have sections for teachers to specify tasks, projects, and information, and sections for students to include work they initiated themselves. As well, students may be encouraged to make choices within teacher initiated projects about specific topics, sources of information, and styles of presentation.

ePortfolios are developmental and the format will evolve over time. Early attempts at introducing ePortfolios into a classroom may be teacher centred, and may become more student centred as the skills and confidence of students and the teacher grow. ePortfolios that fail to make this transition, though, are likely to forfeit major benefits, including:

1. learner ownership and engagement;
2. the emotional connection between the student and their ePortfolio (affective component);
3. evidence of the learner's authentic or unique voice;
4. the ePortfolio as story;
5. the contribution of the ePortfolio to lifelong learning; and
6. the embracing of a constructivist model that supports deep learning (Barrett & Wilkerson, 2004).

The key to learner ownership and engagement is that ePortfolios should tell a story of individual student learning (Barrett, 2004a):

> It is the story of knowing. Knowing about things . . . Knowing oneself . . . Knowing an audience . . .Portfolios are students' own stories of what they know, why they believe they know it, and why others should be of the same opinion. A portfolio is opinion backed by fact . . . students prove what they know with samples of their work. (Paulson & Paulson, 1991, p. 2)

Teacher awareness of student ownership of their ePortfolio and the story it tells about their learning should ensure that an ePortfolio "is done by the student, not to the student" (Paulson, Paulson, & Meyer, 1996, p. 71). Barrett (2004a) agrees that the learner must be motivated by an emotional connection with the ePortfolio driven by ownership, personal engagement, and a feeling of being in control. Similar to a book and its author, an ePortfolio should reflect the learner's unique voice, which contributes to the authenticity of the ePortfolio. The advantage of using technology is that images and sounds can be integrated into the presentation to enhance a viewer's perception of the learner. Barrett (2004a) also argues that student reflections should be unique, and develop a connection between learners and viewers. Reflections make an important contribution to the deep learning that ePortfolios facilitate. Students need to learn how to be reflective, and it should not be assumed that all students will develop the skill at the same rate. The process of preparing reflections can be a tool to integrate learning, and can assist students to be self-directive and lifelong learners.

Deep learning, as the term suggests, means "getting below the surface" of a topic, while breadth refers to the "extensions, variety, and connections needed to relate all the separate ideas" (Burke, Fogarty, & Belgrad, 2002, p. 7). Barrett (2004a) illustrates the two concepts in Table 2.10.

Table 2.10: Deep Learning versus Surface Learning

	Attributes of Deep Learning		Attributes of Surface Learning
1.	Learners relate ideas to previous knowledge and experience	1.	Learners treat the course as unrelated bits of knowledge
2.	Learners look for patterns and unrelated principles	2.	Learners memorize facts and carry out procedures routinely
3.	Learners check evidence and relate it to conclusions	3.	Learners find difficulty in making sense of new ideas presented
4.	Learners examine logic and argument cautiously and critically	4.	Learners see little value or meaning in either courses or tasks
5.	Learners are aware of the understanding that develops while learning	5.	Learners study without reflecting on either purpose of strategy
6.	Learners become interested in the course content	6.	Learners feel undue pressure and worry about work

(Barrett, 2004a)

2.4.6 ePortfolio Stages of Development

As described earlier, ePortfolios lie on a continuum of development from teacher to student centred that may relate to a teacher's confidence and the purpose they have assigned for ePortfolios. In reference to paper based portfolios, Barrett (2004a) lists in order seven different versions that demonstrate this concept:

1. folder of work;
2. collection of work;
3. teacher-organised portfolio;
4. showcase portfolio;
5. progress portfolio;
6. teacher-and-child portfolio; and
7. child-organised (p. 5).

These levels are further articulated in Table 2.11. The table is useful for indicating the present stage of development of an ePortfolio, and also informs teachers about what could be achieved by moving on to another level.

Table 2.11: Levels of ePortfolio Implementation

Level	ePortfolio Implementation
0	A collection of artefacts
1	A collection of artefacts with reflective statements
2	A collection of artefacts with reflective statements & self-assessment a. A learning portfolio (journal entries with associated artefacts) b. A showcase or marketing portfolio (a celebration of learning or an employment portfolio)
3	A collection of artefacts with reflective statements & self-assessment, linked to course outcomes, program outcomes, or standards a. A non-validated assessment portfolio
4	A course-centred portfolio: A collection of artefacts with reflective comments & self-assessment, linked to course outcomes including validation & feedback from faculty, used for course assessment
5	A program-centred portfolio: A collection of artefacts with reflective comments & self-assessment, linked to program outcomes including validation & feedback from faculty, used for program assessment
6	A standards (or goals)-centred portfolio: A collection of artefacts with reflective comments & self-assessment, linked to standards including validation & feedback from faculty, used for individual learning support and program assessment
7	A learner-centred portfolio: A collection of artefacts with reflective comments & self-assessment, linked to learner goals or outcomes including validation & feedback from faculty, used to support individual learning, growth, professional development.

(Barrett, 2002)

ePortfolios may be created with either generic tools or customised systems. In Table 2.12, Gibson and Barrett (2002) detail the developmental stages of ePortfolios designed with generic tools.

Table 2.12: Developmental Stages of ePortfolios Designed with Generic Tools

1. Planning and Goal Setting, Scheduling: timelines; project management systems; visualization; databases; spreadsheets.
   a. Planning takes place "off line" and artefacts of the process are not expected in the portfolio;
   b. Documentation of planning and the evolution of goal setting are acceptable content for portfolios; and
   c. Expectations include the documentation and portfolio presence of planning/goal setting and adjustments the story of as part of growth over time.
2. Creativity Tools for Visualization: animation; audio; video; databases; spreadsheet representations; graphic production.
   a. Inflexible templates or stock multimedia elements (sounds, graphics, logos) are used by learners for the organization and display of their portfolios;
   b. Learners are encouraged to create some original elements or organizational aspects of their portfolios; and
   c. Learners are taught and supported in the development of rich and varied, expressive multimedia skills. Portfolios display the individual creativity of each learner.
3. Communications: e-mail; threaded discussions; video conference systems; and webcasts.
   a. Program does not include telecommunications in its processes or documentation;
   b. Some telecommunications are used to develop plans, goals, work products, and the creation of portfolios. Some learners document their communications for inclusion; and
   c. Portfolios show evidence of use of telecommunication tools in planning, goal setting, work improvement over time, and final products.
4. Collaboration: threaded discussions; net meetings; video conferences; whiteboards; and asynchronous work spaces.
   a. Program does not emphasize or there is little evidence of collaboration in portfolios;
   b. Program uses some generic tools for collaborative work and encourages learners to include evidence of collaboration in at least one portfolio; and
   c. Documentation from generic collaboration tools is prompted and supported in all portfolios.
5. Reflective Process: Word processor, video, audio, multimedia production.
   a. Written or audio reflections primarily deal with the alignment of work to program requirements or personal statements;
   b. Reflections using multimedia expression are encouraged. Alignment of purpose and audience may have a single focus and reside in one portfolio, (e.g., graduation portfolio demonstrating that standards have been addressed; and
   c. Learners are collaboratively assisted to reflect and create alignment of purpose and audience in more than one portfolio, ideally, a working folio. a program completion folio, and one or more other folios for employment , public and private purposes.
6. Connection Capabilities: Hypertext capabilities in word processors or publication tools, web page applications, raw HTML.
   a. Some learners invent their own ways of making a few linkages to a schema;
   b. Several learners make some linkages to or publish their work alongside at least one schema; and
   c. Learners are expected to extensively link their work to more than one schema, depending on audience and purpose of portfolio.
7. Organizational Flexibility: Hypertext capabilities.
   a. Learners use few if any hypertext or database capabilities to flexibly organise their work;
   b. Methods of flexible organization are taught and encouraged, but not expected of all learners; and
   c. All learners maintain more than one way to organise their work collections and utilize more than one organizational framework to represent their work.
8. Display Flexibility and Transportability: Many tools have display possibilities, advanced uses include database driven web displays, active server pages, and dynamic HTML.
   a. Display of works is essentially the same from page to page or slide to slide. Generic tools are used with their most basic default capabilities;
   b. Generic tools are used with some of their more advanced hypermedia features; and
   c. Portfolios show evidence that students can use the advanced hypermedia features of generic tools to create flexible or dynamic displays of their work. Final format is portable and transferable in digital format.
9. Data & Information: Databases, spreadsheets, visualization tools, GIS, web searches, virtual libraries.
   a. Portfolios give a limited picture of the student in terms of their own intentions for learning and the programs' intentions for their learning;
   b. Portfolios give a reasonably valid and detailed picture of some aspects of the student's learning and show some of the balance of program and individual intentions of learning; and
   c. Each portfolio is a rich, valid and balanced picture of an individual student (their intentions in learning balanced with the program's intentions for their learning) that is in part, not commensurable with other students.

10. Start-up Costs & Maintenance Servers: system software, lab licenses.
    a. Program has little or low centralized support for applications, updates, server space and access, multiple licenses for products from uncoordinated buying across the' organization;
    b. Program provides periodic support with a few options for training, but the type and depth of support places a high burden on some people creating barriers to ubiquitous implementation;
    c. Program has a continuously improving IT support that is client centred on the learning program and all of its members. IT provides low cost group purchases with automatic updates of the software suite; and
    d. Provides on demand and continuous training and support to both learners and teachers.

(Adapted from Gibson & Barrett, 2002, pp. 561-569)

Barrett (2000b) sees ePortfolios as being derived from two sources (a) portfolio development (collection, selection, reflection, and projection); and (b) multimedia development (decide, design, develop, and evaluate). By listing these concepts together in Table 2.13, Barrett (2000b) devised a list of processes that relate to the development of ePortfolios. Again, teachers may work through these stages to create ePortfolios that meet their needs.

Table 2.13: Portfolio and Multimedia Development

ePortfolio Development	Portfolio Development	Multimedia Develop.	Processes
1. Defining Context & Goals	Purpose & Audience	Decide, Assess	Determine needs, goals & audience
2. The Working Portfolio	Collect, Interject	Design, Plan	Determine content & sequence
3. The Reflective Portfolio	Select, Reflect, Direct	Develop	Gather and organize multimedia materials
4. The Connected Portfolio	Inspect, Perfect, Connect	Implement, Evaluate	Present & evaluate effectiveness
5. The Presentation Portfolio	Respect (Celebrate)	Present, Publish	Share with others

(Barrett, 2000b)

Table 2.14 concludes this investigation of the stages of ePortfolio development, and illustrates the progressively complex applications of ePortfolios as they serve more complex purposes.

Table 2.14: Stages of ePortfolio Development

Stage 1: Defining the Portfolio Context
- a. Identify the assessment context;
- b. Identify the purpose of the portfolio;
- c. Identify the learner outcome goals (from standards);
- d. Know the primary audience to decide format and storage;
- e. Identify available resources (hardware and software); and
- f. Identify technology skills (current and to develop).

Stage 2: The Working Portfolio
- a. From goals and standards, determine the types of portfolio artefacts to be collected;
- b. Select the software development tools for context & from available resources (software controls, restricts, or enhances the portfolio development process, and should match the vision and style of the portfolio developer);
- c. Collect artefacts, store on a hard drive, a server, or videotape;
- d. Set up electronic folders for each standard to organize the artefacts;
- e. Use a word processor, database, hypermedia software or slide show to articulate the goals/standards to be demonstrated in the portfolio and to organize the artefacts;
- f. Identify storage and presentation medium (i.e., computer hard disk, videotape, local-area network, a WWW server, CD-ROM, etc.);
- g. Gather multimedia materials that represent achievement (from different points of time to demonstrate growth and learning that has taken place);
- h. Write short reflective statements with each artefact stored, to capture significance at the time it is created;
- i. List and organize the artefacts;
- j. Use a scanner, camera, sound digitizing to digitize artefacts;
- k. Use multimedia to add style and individuality to the portfolio; and
- l. Save work in a format that can be easily used.

Stage 3: The Reflective Portfolio
- a. Review the reflective statements written for each artefact as it was stored, elaborating on its meaning and value and why it is selected for the presentation portfolio;
- b. Write general reflective statements on the achievement of the goals or standards;
- c. Select the artefacts that represent achievement of the standards or goals; and
- d. Set learning goals for the future from the reflections and feedback (ask What? So what? Now what?).

Stage 4: The Connected Portfolio
- a. Create hypertext links between goals, work samples, rubrics, and reflections;
- b. Insert multimedia artefacts;

c. Create a table of contents to structure the portfolio;
d. Select software that allows easy creation of hypertext links;
e. Linking reflections to artefacts makes the thinking process (artefacts to evidence) explicit;
f. A single artefact may demonstrate multiple standards; and
g. Use the evidence to make instruction/learning or professional development decisions.

Stage 5: The Presentation Portfolio

a. Record the portfolio to an appropriate presentation and storage medium (different for working, formal or presentation portfolios;
b. Present the portfolio before an audience (real or virtual) and celebrate the accomplishments (public commitment provides motivation to carry out the plan of a formative portfolio); and
c. Evaluate the portfolio's effectiveness in light of its purpose and the assessment context.

(Adapted from Barrett, 2000a)

2.4.7 Authentic Pedagogy

The classroom implementation of ePortfolios is an authentic task because ePortfolios are created using the same technology as workplace professionals use (Means & Olson, 1995). Professionals also have a role in providing a benchmark for the quality of the product. Selinger (2001) includes this criterion in her definition of authenticity as "tasks which pupils can relate to their own experience inside and outside of school [and] tasks which an experienced practitioner would undertake" (p. 96). ePortfolios though, are more than an application of technology to produce a discrete artefact, but rather represent a system for managing and facilitating student learning. That is, students have first hand experience with a learning environment saturated with technology. This overlap between the world of work and the world of the classroom enhances opportunities for students to become involved in tasks that are authentic and enriching, as well as preparing them for future occupations (Loveless et al., 2001). Means and Olson (1995) point out that the technologies students access in creating their ePortfolios links them to experts, places, and databases, and supports an active role for students in making choices about how they are going to collect, analyse, and present information. The teacher's role is to set goals, to provide guidelines, resources, and suggestions, and to move from group to group.

However, an activity is not necessarily authentic just because technology is being used. Authenticity of a task depends on the intentions of the teacher and "the goals and content of the activity" (Means & Olson, 1995, p. 122). For example, traditional approaches to learning that focus on the transmission and retention of information take learning out of context in that students are not working on real world problems or in the field. That is, students are prevented from learning how experts go about their job (Brown et al., 1989). On the other hand, constructivist theories of learning focus on contemporary issues and problem solving, with students working in open-ended learning environments. These environments should be designed to reflect the rich and complex problem contexts of the real world, and "include tools, other people, and an elaborate setting" (Williams, 1992, p. 372). Means and Olson (1994) support this view and propose five features of authentic pedagogy:

1. an authentic challenging task is the starting point;
2. all students practise advanced skills;
3. work takes place in heterogeneous collaborative groups;
4. the teacher is a coach; and
5. work occurs over extended blocks of time (p. 17).

These features apply readily to ePortfolios, e.g., a student may work on an ePortfolio for several years, storing some sections and creating new ones. New information and understandings reshape students' knowledge as they work flexibly through problems and make decisions about the information needed and the processes involved. Enhancing the authenticity of an activity goes beyond exploring "the potential uses for the knowledge" to asking "how can a learning environment be created that reflects those possible uses?" (Collins, 1996, p. 348). This approach should be adopted when creating ePortfolios because it is authentic and more closely resembles the way people learn and solve problems outside of the classroom (Morrison et al., 1999).

Authentic pedagogy tends to be multi-disciplinary because problem solving and learning outside of classrooms is not restricted to discrete subject areas (Luke in Hunter, 2000-2001, p. 137). ePortfolios support an integrated curriculum in an environment that facilitates a balance between processes and content (Woolley & Pigdon, 1997). Students are motivated to work on their ePortfolios because it is challenging, and personal relevance is maintained through their ownership of the project and their role in negotiating the curriculum (Means & Olson, 1995; Morrison at al., 1999). As a learning environment, an ePortfolio supports "risk taking, approximation, the exploration of patterns and relationships, reflection on experience and an understanding of differing interests, points of view and value positions" (Woolley & Pigdon, 1997, p. 30). It also emulates the three phases of natural learning of "engagement, exploration and reflection" (Cook, 1982, pp. 135-136).

Authentic pedagogy is not a new approach to learning. Each of the approaches to learning listed in Table 2.15 goes some way toward a focus on process rather than content, though with varying degrees of flexibility and choice making for the student.

Table 2.15: Approaches to Learning

Inquiry Learning Approach	Problem Based Learning
1. Students encouraged to discover concepts by making and testing predictions; 2. Focuses on solving a problem and building prior knowledge; 3. Process of collecting, organizing, and analysing information; and 4. Subjects are often integrated. (Morrison et al., 1999)	1. Teacher provides the problem and study material; 2. Individual or groups of students decide what they already know and what they need to know; and 3. Problem solving process is based on the scientific method of testing hypotheses. (Morrison et al., 1999)
Activity Based Approaches	**Process Approach**
1. Teacher selects activities and organizes resources; 2. Students make connections between their observations and the principles or theories being taught; 3. Teacher takes on the role of facilitator rather than instructor; and 4. Activities are founded in an authentic context. (Grabe & Grabe, 1996)	1. Students address the questions: a. What do we know already? b. What do we want, and need, to find out? c. How will we go about finding out? and d. How will we know, and show, that we've found out when we've finished? (Cook, 1982, p. 140)
Guided Design	**Project Based Learning**
1. Used mainly in engineering courses; 2. Small groups of students working on projects; 3. Teacher provides background information to an unstructured problem; 4. Gives feedback as required; and 5. Students apply scientific methods to solve the problem. (Morrison et al. 1999)	1. May not be going on all of the time because of the demands made of the teachers; 2. Requires high level of pedagogical skill & broad knowledge of content; 3. More responsibility is expected of students; 4. Teachers need to plan and think carefully about what is important for the students to learn; 5. Individual & groups of students work on different projects at different times; 6. Projects last longer than a school day; 7. Students work co-operatively; 8. Teachers support and diagnose thinking of individual students; and 9. Maintain student autonomy (Means & Olson, 1995)

2.4.8 Authentic Assessment

Engel (1996) says:

> Authenticity can be seen as consistency in time - between what is happening now and what is intended for the future. An action is authentic when aligned with its long-term purposes - when one can look toward the future and see the connection between the means and the end (p. 7).

This definition of authentic assessment reinforces a role for ePortfolios in facilitating the planning of goals, collecting evidence to determine if those goals are met, and reflecting on future goals and actions. Appropriately structured ePortfolios should reflect the ten features of authentic assessment listed by Burke, Fogarty, and Belgrad, (1996):

1. meaningful tasks;
2. multiple assessments;
3. quality products;
4. higher-order thinking;
5. positive interaction;
6. clear tasks and standards;
7. self-reflections;

8. transfer into life;
9. ongoing or informative; and
10. integration of knowledge (p. vii).

Many indicators of a student's progress might not be measurable in a paper and pencil test, including:

1. skills (handwriting, word spacing, number facts);
2. student's control over information;
3. higher-level skills and understanding; and
4. personal characteristics and habits of mind (curiosity, inventiveness, willingness to take risks, self-confidence, sociability) (Engel, 1996, pp. 8-9).

These indicators are interwoven and complex, but may be revealed in an ePortfolio because it is created by the individual with personal meaning and relevance (Engel, 1996). ePortfolios allow teachers to regularly "sit beside" learners, and "to actively reflect on the work that is generated in their classroom" (Stefanakis, 1997, p. 82). Burke (1992) highlights the potential implications of such a simple process in creating ePortfolios as selecting artefacts for inclusion. Students self-evaluate an artefact as they articulate its worth to the teacher, parent, or other viewer. They are required to analyse what extra work is required and become aware of their growth and development as they compare one artefact with another or one ePortfolio with another.

There are two types of assessment which are reflected in the two types of ePortfolios described earlier. That is, summative ePortfolios are concerned with assessment *of* learning, while formative ePortfolios are concerned with assessment *for* learning (Stiggins, 2002). Table 2.16 describes characteristics of each type of assessment and its associated ePortfolio. It is easy to recognise in this table both teacher centred and student centred ePortfolios, which emphasises the need for at least a balance between the two.

Table 2.16: ePortfolios to Support Assessment *of* and *for* Learning

	Assessment *of* Learning		Assessment *for* Learning
1.	Checks what has been learned to date;	1.	Checks learning to decide what to do next;
2.	Is designed for those not directly involved in daily learning and teaching;	2.	Is designed to assist teachers and students;
3.	Is presented in a formal report;	3.	Is used in conversation about learning;
4.	Usually gathers information into easily digestible numbers, scores and grades;	4.	Usually detailed, specific and descriptive feedback in words (instead of numbers, scores and grades);
5.	Usually compares the student's learning with either other students or the 'standard' for a grade level; and	5.	Usually focused on improvement, compared with the student's 'previous best' and progress toward a standard; and
6.	Does not need to involve the student.	6.	Needs to involve the student - the person most able to improve learning.
	Portfolios used for Assessment of Learning		Portfolios that support Assessment for Learning
1.	Purpose of portfolio prescribed by institution;	1.	Purpose of portfolio agreed upon with learner;
2.	Artefacts mandated by institution to determine outcomes of instruction;	2.	Artefacts selected by learner to tell the story of their learning;
3.	Portfolio usually developed at the end of a class, term or program - time limited;	3.	Portfolio maintained on an ongoing basis throughout the class, term or program - time flexible;
4.	Portfolio and/or artefacts usually "scored" based on a rubric and quantitative data is collected for external audiences;	4.	Portfolio and artefacts reviewed with learner and used to provide feedback to improve learning;
5.	Portfolio is usually structured around a set of outcomes, goals or standards;	5.	Portfolio organization is determined by learner or negotiated with mentor/advisor/teacher;
6.	Sometimes used to make high stakes decisions;	6.	Rarely used for high stakes decisions;
7.	Summative - what has been learned to date? (Past to present);	7.	Formative - what are the learning needs in the future? (Present to future);
8.	Requires Extrinsic motivation; and	8.	Fosters Intrinsic motivation - engages the learner; and
9.	Audience: external - little choice	9.	Audience: learner, family, friends - learner can choose.

(Barrett, 2004a)

ePortfolios also provide a vehicle for students to be actively engaged in the reporting process. For example, in student led conferences, students may sit with their parents and/or teachers and walk them through the work they have accomplished (Paulson & Paulson, 1996b).

When parents view their child's ePortfolio, they should recognise the individuality of their child and their achievements, they should view concrete evidence of progress to meet accountability expectations, and the teacher's beliefs about learning and the way the teacher has organised instruction should be transparent (Hebert, 1996).

2.4.9 Computer Literacy and Computer Awareness

In order to create an ePortfolio, teachers and students need to capture, manage, and display artefacts in digital format (O'Rouke, 2001). *Computer literacy* concerns "the knowledge, skills and attitudes which enable [people] to use computer technology to benefit themselves and others by solving problems related to tasks they wish to accomplish" (Newhouse, 1999, p. 42). Five levels of prerequisite technology skills development relating to ePortfolios are described by Barrett (2000a) in Table 2.17.

Table 2.17: Levels of Technology Skills Required

Level	Technology Skills
1	Limited experience with desktop computers but able to use the mouse and run simple programs;
2	Level 1 plus proficient with a word processor, basic email, Internet browsing, can enter data into a pre-designed database;
3	Level 2 plus able to build a simple hypertext (nonlinear) document with links using a hypermedia program such as HyperStudio, Adobe Acrobat Exchange, or an HTML WYSIWYG editor;
4	Level 3 plus able to record sounds, scan images, output computer screens to a VCR, design an original database; and
5	Level 4 plus multimedia programming or HTML authoring, create QuickTime movies live or from tape, program a relational database.

(Barrett, 2000a)

Computer awareness, on the other hand, concerns "the understanding of the role of computer technology in society and the social implications associated with the use of computers in society" (Newhouse, 1999, p. 42). In planning lessons for computer literacy and computer awareness, teachers take into account factors relating to their own beliefs about technology and the needs of children. For example, they may focus on the knowledge, skills, and experiences in technology they believe children need later in everyday life and in the workplace. Conversely, they may believe experiences in technology at the primary school level will not be useful or relevant later because technology changes. Just as some people know little about the mechanics of the car they drive, some teachers prefer to direct attention to applications rather than to how computers work (Newhouse, 1999). Younger teachers who have grown up with technology may have a different perspective and approach to these issues than those who have been exposed to technology later in life (Luke in Hunter, 2000-2001).

Teachers need to decide how computer literacy and computer awareness are to be taught. One option is to plan lessons dedicated to developing awareness and skills as a discrete subject in the curriculum, while another option is to integrate the development of concepts and skills with activities associated with other subject areas. Newhouse (1999) prefers to combine both approaches, but with an emphasis on the integrated approach. In implementing this recommendation, teachers might demonstrate a particular software application relating to ePortfolios and have students perform skill development exercises, but generally rely on the students' capacity to learn to use applications with support from the teacher or peers while performing tasks. This recommendation also applies to the design of activities to support the professional learning of teachers and school administrators as they develop computer literacy and computer awareness associated with ePortfolios. That is, teachers and school administrators will need sessions dedicated to the demonstration of applications, learning skills, and performing skill building exercises, but generally skills will be developed while working on ePortfolios with students. Similarly, they will require expert and peer support during this process.

Besides the practical issues of determining the knowledge and skills required to create ePortfolios, Lankshear et al. (2000) raise other issues relating to power, equity, and authority:

> Why are we doing this? When is it a good idea to do this? What can we sensibly do with this facility? How does it affect our practice? In what ways does it influence what

> our students and we become as people, as literate persons, as knowers? How do we evaluate it? How do we rank it in relation to our educational priorities? Whose interests are served by the efforts of people like us to integrate these new technological applications into our literacy programs? What kind of world are we contributing to building by taking up this technology? What other things will we need to do to help prepare today's learners to live in this world? (pp. 34-35).

Costanzo (1994) is also concerned with these issues:

> Will computers shift control from some external authority to the individual user? Will they help to distribute the instruments of literacy more equitably, or will they function only to buttress a literate elite? If literacy is shaped by new technologies, who is shaping the technologies? What ideological assumptions are being built in, and whose interests do they serve? (p. 19).

The notion that something is done because technology makes it possible, also applies to the implementation of ePortfolio frameworks. "We readily ask of technology 'Can it do X?' but rarely seem to bring ourselves to ask 'Do we really want it to do X? Why do we want it to do X?'" (Kerr, 1999, p. 174). Teachers and school administrators have a responsibility to explore the issues raised by Lankshear et al. (2000), Costanzo (1994), and Kerr (1999) because teaching is a socially oriented task. That is, the process of teaching communicates social concepts and values to children. One of the early tasks that teachers and school administrators must undertake in considering an ePortfolio framework is its intended purpose, impact, and implications, and they must review their position on these issues during implementation.

2.4.10 Information Literacy

Information literacy and critical thinking skills apply to ePortfolios in two ways. First, these skills are developed in learning activities that lead to artefacts to be included in ePortfolios. For example, a teacher may undertake a research project with the children to investigate an issue. The project may be published as a PowerPoint presentation or video that is included in the children's ePortfolios. Second, the management of an ePortfolio is itself an opportunity for children to apply the skills of information literacy and critical thinking. For example, when students are selecting artefacts for inclusion, they are evaluating the artefacts and determining how these can be integrated and organized into the ePortfolio as a whole project.

Information literacy is defined as the "ability to access, evaluate and use information from a variety of sources" (Doyle, 1992, p. 2). An information literate person:

1. recognizes the need for information;
2. recognizes that accurate and complete information is the basis for intelligent decision making;
3. formulates questions based on information needs;
4. identifies potential sources of information;
5. develops successful search strategies;
6. accesses sources of information including computer-based and other technologies;
7. evaluates information;
8. organizes information for practical application;
9. integrates new information into an existing body of knowledge; and
10. uses information in critical thinking and problem solving (Doyle, 1992, p. 2).

According to Crane (2000), the Internet is an effective tool in supporting the development of information literacy skills. Children are motivated and are able to communicate with experts and children in other places. Gathering information from the Internet to solve a problem has a closer link to the real world than textbooks designed solely for classroom use. Children can work collaboratively on a project and take more control over their learning as they investigate issues of their choosing and at their own pace. Examples from the Internet can be used in discrete lessons to demonstrate bias, propaganda, and commercially driven information. As revealed in the Literate Futures project (Education Queensland, 2000), new strategies in literacy focus on effective and efficient research techniques, including scanning, note taking, and making informed decisions about the relevance and worthiness of information (Lankshear et al., 2000; Crane, 2000). These techniques are the basis for children to be involved in problem solving activities as an approach to developing their critical and creative thinking (Crane, 2000). Crane (2000) refers to Bloom's Taxonomy to understand the increasing complexity of critical thinking as children work through the solving of a problem:

1. recall - ability to remember or recognize information;
2. comprehension - ability to understand and discover relationships among facts;
3. application - ability to solve a lifelike problem using learned material;
4. analysis - ability to break down information into its component parts to solve a problem;
5. synthesis - ability to solve a problem by putting together parts to create a new whole; and
6. evaluation - ability to make judgments and decisions based upon standards (p. 53).

Learning how to learn and to solve problems is important for three reasons. First, "knowing how to determine the existence and location of information is as important as knowing the information itself" (Summit, 1987, p. 61). Second, teachers are unable to provide children with all the information they need for their lifetime (Crane, 2000). Third, to focus on the skills of information literacy to support self-directed learning, "where anyone learns anything, anytime, anywhere" (Ross & Bailey, 1997, p. 16), is to empower with technology.

2.4.11 Multiple Intelligences

The multimedia aspect of ePortfolios facilitates different ways to organize and present information of different types and origins. For example, links may take the viewer to a document, a video, a photo, a drawing, or a musical piece. Viewing student work is no longer a linear process as links can take the viewer to any part of the ePortfolio, or through a sequence designed by the student. Different types of information can be presented side by side. The way ePortfolios are created should give viewers insights into students' preferences and ways of organizing learning. Hartnell-Young and Morriss (1999) pursued this concept further by listing the way multimedia presentations can contribute to the application of Gardener's multiple intelligence theory in Table 2.18.

Table 2.18: Multimedia Contribution to Gardener's Multiple Intelligences Theory

Intelligence		Description	Multimedia Contribution
1.	Logical/Mathematical (scientific thinking)	This intelligence deals with inductive and deductive thinking and reasoning, numbers, and the recognition of abstract patterns.	Text and data; tables and graphs; comparative analysis of teacher's work over time links to related documents.
2.	Verbal/Linguistic	This intelligence is related to words and language, written and spoken.	Text both written and oral; creative forms of expression; sound; variety of text forms, formats, fonts, and design.
3.	Visual/Spatial	This intelligence relies on the sense of sight and being able to visualize an object.	Graphics; links within the portfolio and to other sites; logos, images; creative forms of expression.
4.	Bodily/Kinaesthetic	This intelligence is related to physical movement and the knowings/ wisdom of the body.	Producer is "learning by doing"; ability to move through the portfolio (not a static page); Reader can create own movement through portfolio.
5.	Musical/Rhythmic	This intelligence is based on the recognition of tonal patterns, sounds, and a sensitivity to rhythm and beats.	Sound which captures mood, style, feelings, etc.; video.
6.	Interpersonal	This intelligence operates primarily through person-to-person relationships and communication.	Photographs of self; photographs of others involved; comments about self and feedback from others.
7.	Intrapersonal	This intelligence relates to inner states of being, self-reflection, metacognition, and awareness of meta-spiritual realities.	Reflection by self and others; planning and production requires metacognition; integration of values and action through linked material.
8.	Naturalist	This intelligence relates to recognizing relationships and systems within one's environment.	Organization of materials and links into a system of levels of information.

(Hartnell-Young & Morriss, 1999, p. 15)

2.4.12 Content of ePortfolios

The principles developed to create paper based portfolios also apply to ePortfolios as described by Burke et al. (1996):

1. project purposes (examine the big picture);
2. collect and organise artefacts;
3. select key artefacts;
4. interject personality;
5. reflect metacognitively (reflect meaning and value to the student);
6. inspect to self-assess (long-term and short-term goals);
7. perfect and evaluate (fine tune content);
8. connect and conference (meaningful dialogue among students, teachers, and parents);
9. inject/Eject to update (keeps the portfolio fresh); and
10. respect accomplishments (exhibiting the portfolio) (pp. xiii-xiv).

Paper based portfolios have traditionally held a variety of artefacts, including projects, co-operative works, interviews, simulations, artwork, graphic organizers, peer evaluations, computer programs, self-assessments, musical pieces, logs and journals, observation checklists, videos, and performances (Burke et al., 1996). ePortfolios can also hold these artefacts, but are not meant to include everything that a student produces. A range of work samples should be collected that represent progress, rather than just the best work. Artefacts in ePortfolios may be grouped into three types:

1. products (such as essays, reports, lists of books that the student has read, a list of problems solved, models, work samples etc.);
2. processes (such as goals for learning, outlines, drafts, strategy assessments, interim evidence, unfinished products, and notes on progress); and
3. students' perceptions of their learning (such as motivation, and self-assessments of learning) (Barrett, 2002).

To be effective, ePortfolios need to be regarded as evidence of students' achievements of specified goals relating to products created, the processes involved, and students' perceptions about their learning. As well, the teacher needs to provide feedback to validate the evidence. Barrett (2002) explains this process in the following formula:

Evidence = Artefacts + Learner Reflections + Validation or Feedback.

Table 2.19 lists the types of evidence that may be sought.

Table 2.19: Types of Evidence in ePortfolios

Type of Evidence	Evidence
1. Artefacts	Documents produced during normal academic work
2. Reproductions	Documents of student work outside the classroom
3. Attestations	Documentation generated about student's academic progress
4. Productions	Documents prepared just for the portfolios
a. Goal Statements	Student's personal interpretations of each specific purpose for the portfolios
b. Reflective Statements	Students write as they review and organize the evidence in their portfolios
c. Captions	Statement attached to each piece of portfolio evidence, articulating what it is, why it is evidence, and of what it is evidence

(Barton & Collins, 1997)

ePortfolios should have a table of contents, and each task should carry the date of the work, a description of the task, students' reflections, and links to the areas of assessment involved in the task. At the beginning of a learning task, students should be encouraged to ask these questions:

1. What do I plan to accomplish with this task?
2. How I plan to get there? and
3. My strategies for accomplishing this task.

A person viewing an ePortfolio must be able to explicitly or implicitly recognise:

1. the rationale (purpose for forming the portfolio);
2. intents (its goals);
3. contents (the actual displays);
4. standards (what is good and not-so-good performance); and
5. judgments (what the contents tell us) (Paulson et al., 1996, p. 71).

Students should review their ePortfolios periodically to add new material and reflections. A *comments* button may be used for students to review and provide feedback for each other's work. Reflecting on the work of others encourages self-reflection, and provides an opportunity for students to learn about learning (Paulson et al., 1996). That is, by viewing and reflecting on each other's work, students see how others have approached the same task, they have a basis on which to compare their own work, they can see the processes involved in learning, and can appreciate that different people learn in different ways.

One of the earliest tasks in creating ePortfolios is to establish their purpose (Paulson et al., 1996). The purpose might change over time and ePortfolios may have several purposes. Just as ePortfolios should contain artefacts that illustrate the growth of individuals, so too will ePortfolios as a whole mature and illustrate growth. For example, teachers and students will develop skills that they will want to reflect in their ePortfolios. Both teachers and students would benefit from viewing models of ePortfolios that again encourage reflection on how others have approached learning. Table 2.20 provides more details about aspects that need to be considered in creating an ePortfolio.

Table 2.20: Pedagogical Requirements of Paper-Based and Electronic Portfolios

Element		Requirements
1. Storage Space	a.	Store digital artefacts (with meta-tags);
	b.	Store learner self-reflection and self-assessment on each artefact;
	c.	Store feedback on each artefact from a session(s) (independent validation); and
	d.	Store details of the assignment with criteria for assessment (rubrics).
2. Security	a.	Ability to restrict access, setting permissions to view: artefact only; artefact with reflection; artefact with reflection and feedback; and
	b.	Ability to set permissions separately for faculty to view portfolio and provide feedback on work.
3. Linking & Grouping	a.	Ability to organize portfolio in a variety of ways (flexibility in organization) by: standards or learning outcomes; course; date (entered, last updated, etc.); status of work (Work in progress, ready for assessment, ready for publication); and
	b.	Ability to include: goals for portfolio, contents of portfolio; learning goals or standards; resume.
4. Reflection	a.	Ability to reflect on a specific grouping of artefacts to make a particular case (i.e., how this collection demonstrates achievement of standard/learning goal); and
	b.	Ability to set learning goals and future direction.
5. Publishing	a.	Ability to create a variety of portfolios, depending on audience and purpose; i. Learning portfolio (a reflective journal with artefacts; primary audience is the learner); ii. Assessment portfolio (a highly-structured portfolio demonstrating achievement of learning goals or standards, with independent validation and feedback on artefacts/reflections from faculty); iii. Employment or Marketing Portfolio (a semi-structured portfolio, developed for the purpose of making the case for suitability for a particular position); and iv. Showcase Portfolio (a collection of artefacts, with reflections, that demonstrate growth over time, highlighting specific achievements).
	b.	Ability to individualize the portfolio, to allow creativity of expression in the presentation (to avoid the "cookie cutter" effect or identical "look and feel" of a data-base or template-based portfolio).
6. Portability	a.	Ability to archive work in portable format CD-ROM, HTML or PDF Archive, DVD; and
	b.	Ability to use in another institution or be maintained by learner

(Barrett, 2002)

2.4.13 Hardware

The simplest method of creating ePortfolios is for students to work directly at the computer. For example, a piece of writing is best created using a word processor with the student making use of the editing facility, rather than writing the piece by hand for later typing. This may not always be possible, for example, if not enough computers are available. Scanners may be used to digitize information, either as a graphic, e.g., photo or diagram, or by using the Optical Character Recognition (OCR) facility to scan an editable version directly into Word. When using a digital still or video camera, students may need to download to and edit on a dedicated computer with a larger capacity, and then transfer those files to their computer. During video capture and editing it is necessary to consider the size of the file being created and limit the length of the video.

Students and teachers need to be comfortable in creating directories and attaching files to an ePortfolio. Recordable DVD drives are now commonly available to provide a backup of work and for transferring ePortfolios to home computers, while cartridge drives and external hard drives may also be used for larger storage capacity. USB storage devices or memory sticks are also becoming cheaper and increasing in capacity, and are rapidly becoming a common school requisite. There is the added convenience of not requiring a driver for computers operating with Microsoft XP Windows, Vista, or Mac OS.

Computers may be portable, placed at the back of a classroom, or grouped in a lab. Each situation results in different demands on teachers' attention, interaction with children, and activities that can be undertaken (Loveless et al., 2001). Other aspects of the physical environment that need to be considered include lighting, glare, reflection, chalk dust, power and network disruptions, equipment failure, and time to load programs (Sandholtz et al., 1996).

Local area networks are implemented throughout Queensland state schools and students begin their work by logging on to a central server from any computer within a school. They are able to work with personalized settings and access their personal data as well as data shared across the network. This is similar to the way workers in industry operate and avoids the frustration of either having to change settings or work with the settings as they were left by the last user. Modern high speed laser printers and switches are overcoming frustrations when work is placed in a print queue, for example, at the end of a lesson when a class of 25-30 children are trying to print their work before leaving the classroom (Sandholtz et al., 1996).

2.4.14 Software

There are two types of software that may be used to create ePortfolios:

1. generic tools, e.g., word processors, HTML editors, multimedia authoring tools, portable document format; or
2. customised systems involving servers, programming and databases (Gibson & Barrett, 2002, p. 556).

This discussion focuses on the use of generic tools such as Microsoft Word, PowerPoint, Access, Excel, and FrontPage. These tools are readily available to Queensland state school teachers through the Education Queensland agreement with Microsoft. After paying an annual fee, for example $A1200 for a school with 250 children, the only other cost for schools under this agreement is to purchase updated media, for example, $A60 for Publisher 2003. Standardized software allows data to be transferred across applications and from one school or teacher to another.

Other software may need to be purchased or downloaded from the Internet. For example, Adobe Acrobat Reader is available free on the Internet, while Adobe Acrobat Writer, used to convert Word to PDF (Portable Document Format) and vice versa, has to be purchased. There are numerous programs available to edit graphics, e.g., Photoshop, Paint Shop, and PhotoStudio, with some provided free with cameras and scanners. Irfanview is a simple but useful graphics management and editing program that is available free from the Internet. It may be used to change the size and names of batches of photos and to crop photos.

An ePortfolio may be managed with an HTML editor such as FrontPage, which creates a shell so that documents, images, and other artefacts may be accessed and viewed by hyperlinks. FrontPage generates additional files and directories that require management. ePortfolios may also be created in PowerPoint. Teachers may consider using the facility (under *Insert; Hyperlink*) to link one PowerPoint page to another within the presentation, rather than simply viewing pages in linear sequence (Barrett, 2000). Each of these approaches emphasizes the multimedia nature of ePortfolios, as media of many different formats may be assembled for seamless viewing.

In selecting software, teachers need to be aware of the need to create hyperlinks between goals, outcomes, and artefacts displayed in multimedia format. Internet and email access may also be a desirable component. The software needs to be accessible to and accommodate the audience, goals, the skills of students and teachers, and should work on the existing equipment. Barrett (2000a) provides an outline in Table 2.21 of the types of software commonly available and possible applications.

Table 2.21: Applications of Software for ePortfolios

	Software		Applications
1.	Databases, e.g., Access	a.	Teacher centred portfolio tools to keep track of achievement; and
		b.	Relational databases are series of interlinked structured data files with common fields, e.g., data files with personal details, list of standards, and achievements.
2.	Hypermedia, e.g., Hyper Studio	a.	Allows integration of various media types in a single file (individual screens described as cards linked together by buttons).
3.	Multimedia Authoring, e.g., Macromedia Director	a.	Icon based authoring system in which the author builds a flow chart to create a presentation; and
		b.	Create self running programs without player software.
4.	Web Pages, e.g., FrontPage, Netscape Composer	a.	Use built in tools to create web pages;
		b.	Convert Word documents into Web pages; and
		c.	Create hyperlinks between goals and artefacts.
5.	PDF Documents, e.g., Adobe Acrobat	a.	Create documents or convert Word documents using Adobe PDF Writer;
		b.	Easy to access on free Acrobat Reader software;
		c.	Navigate using bookmarks or hypertext links; and
		d.	Security coding available.
6.	Multimedia Slideshows, e.g., PowerPoint	a.	Slides may be viewed in linear sequence or hyperlinked to each other; and
		b.	Allow integration of sound and video.
7.	Digital Video	a.	Presentation improved by editing, addition of sound and script; and
		b.	Large file size.

(Adapted from Barrett, 2000a)

Barrett (2000b) uses a six level scale in Table 2.22 to indicate the sophistication of software that teachers may use to create classroom ePortfolios.

Table 2.22: Levels of ePortfolio Software

Level	Software
1	No digital artefacts, some videotape artefacts
2	Word processing or other commonly-used files stored in electronic folders on a hard drive, floppy diskette or LAN server
3	Databases, hypermedia or slide shows (e.g., PowerPoint), stored on a hard drive, Zip, floppy diskette or LAN server
4	Portable Document Format (Adobe Acrobat PDF files), stored on a hard drive, Zip, Jaz, CD-R/W, or LAN server
5	HTML-based web pages, created with a web authoring program and posted to a WWW server
6	Multimedia authoring program, such as Macromedia Authorware or Director, pressed to CD-R/W or posted to WWW in streaming format

(Barrett, 2000b)

2.4.15 Evaluating ePortfolios

Usability is a factor that teachers and students need to consider in the design and evaluation of their ePortfolios, and “refers to how easy it is for users to learn a system, how efficiently they can use it once they have learned it, and how pleasant it is to use” (Mack & Nielsen, 1994, p. 3). A heuristic evaluation of an ePortfolio is appropriate as the usability inspection method, which involves examining “the interface and judg[ing] its compliance with recognized usability principles (the ‘heuristics’)” (Nielsen, 1994, p. 26). Usability principles may be displayed for student reference, and include:

1. simple and natural dialogue;
2. speak the users’ language;
3. minimize the users’ memory load;
4. consistency;
5. feedback;
6. clearly marked exits;
7. shortcuts;

8. precise and constructive error messages;
9. prevent errors; and
10. help and documentation (Nielsen, 1994, p. 29).

Teachers and students could apply the "jog-through technique" to ensure these principles are applied (Aedo, Catenazzi, & Días, 1996).

A simpler evaluation method may consider just three elements:

1. content (what purposes do you have, what image of yourself do you wish to portray);
2. presentation (graphics, navigation); and
3. links (online resources, email) (Grassian, 2003, para. 1-10).

A more comprehensive approach to evaluating ePortfolios is described in Table 2.23.

Table 2.23: Evaluating ePortfolios

1. Operational Fundamentals: Basic criteria that apply throughout the e-Portfolio so that the site functions well
   a. Appearance and navigation are clear and consistent;
   b. All links work and media displays as intended;
   c. Images are optimised for the web;
   d. All programming is appropriate (not too limited or too flashy);
   e. Text is readable (fonts, sizes, and contrast);
   f. Spelling and grammar are correct; and
   g. Published materials respect copyright laws.
2. Evidence: Academic, co-curricular and personal evidence
   a. Organizational scheme connects all evidence into an integrated whole;
   b. Features or showcases a specific piece of evidence;
   c. Shows depth in major and related experience;
   d. Shows breadth of knowledge and experience; and
   e. Includes a resume (one page, printer friendly).
3. Reflection
   a. An underlying personal yet professional message is integrated into the ePortfolio;
   b. Audience and purpose of ePortfolio is described or is obvious;
   c. Addresses the Seven Career & Essential Life skills;
   d. Reflective comments about evidence as well as reflective comments about what this evidence says about the student is integrated into the ePortfolio;
   e. Includes short-term goals (skills you need to add/improve, experience you are seeking);
   f. Includes long-term goals (professional and/or personal aims); and
   g. Interpretation of your own learning is an important theme of the ePortfolio.

(Penn State, 2004, para. 2)

2.4.16 Issues with ePortfolios

There are a number of issues that teachers and school administrators will need to address before and during the implementation of ePortfolios in their classrooms and schools. Mention has already been made of the need for hardware such as sufficient computers, scanners, cameras, and facilities for information storage. Teachers will need to be supported as they learn to use the equipment, and to manage hardware and software failures. There will be small but irritating and time consuming issues such as printers that do not work, and forgotten passwords. As well, care will need to be taken in publishing ePortfolios to protect students and their privacy. Copyright will need to be considered as students will be copying material into their ePortfolio. Ownership of ePortfolios, too, may come into question if there is a dispute about intellectual property, e.g., a student may develop a marketable innovation as part of their work. Teachers may need to make decisions about censorship, that is, about what students may or may not include in their ePortfolios. If student ownership of an ePortfolio is to be encouraged, this issue is not as easily addressed as it may seem at first.

It is essential that ePortfolios have a purpose, and it is just as essential that the assigned purpose is reviewed. ePortfolios represent a large investment in time, effort, and resources, and need to be making worthwhile contributions to learning, or at least meeting intended purposes. ePortfolios also require thoughtful planning, creativity, and a willingness to be innovative. These attributes are not shared uniformly across the teaching profession, and some teachers will need more encouragement and support than others.

Barratt (2003) lists other issues that need to be considered that were derived from the five dangers of ePortfolios proposed by Shulman (1998):

1. Lamination: A portfolio becomes a mere exhibition, a self-advertisement, to show off;
2. Heavy lifting: A portfolio done well is hard work. Is it worth the extra effort?
3. Trivialization: People start documenting stuff that isn't worth reflecting upon.
4. Perversion: Why will portfolios be more resistant to perversion than all other forms of assessment have been? Will the portfolio become objective, a very cumbersome multiple choice test if used to compare students? and
5. Misrepresentation: Does the emphasis on isolated examples of "best work" misrepresent the [students] "typical work" so as not to be a true picture of competency? (pp. 10-11).

Baker (2000) observed these challenges in classrooms:

1. student inability to differentiate between quality information and "flashy" sources;
2. student ability to create substantive products that are not simply "flashy";
3. student ability to deal with conflicting or inaccurate information;
4. accuracy of what students reported; and
5. privacy of students as they risk developing their literacy abilities (p. 85).

2.4.17 Implementing ePortfolios

The following questions have been drawn from the literature review to stimulate thinking about ePortfolios and the issues that need to be addressed:

1. What is your context?
2. What purposes would ePortfolios serve in your classroom or school?
3. Who is the audience and what technology do they have to view ePortfolios?
4. What elements need to be included in the design of your ePortfolios?
5. What software would be used to organise and view the student's work (e.g., FrontPage, PowerPoint)?
6. What software would be used for publishing and editing (e.g., Word, Publisher, video editing)?
7. What technology do you have and what needs to be purchased?
8. What skills do you and your students have in using technology?
9. How will data be stored?
10. How will time be managed (e.g., scanning and editing artefacts, reviewing ePortfolios, talking with students)?
11. How will the ePortfolios be viewed and by whom? What privacy and security issues need to be addressed?
12. What other management issues need to be considered?
13. Will your ePortfolios be teacher centred or student centred?
14. How will you monitor the curriculum to ensure core outcomes and literacy and numeracy skills are still being covered?
15. What changes will occur in teaching practices when ePortfolios are implemented?
16. What changes will occur in conversations between teachers and students, teachers and parents, and students and parents?
17. How will ePortfolios change the use of technology in your classroom or school?
18. What books, articles or web sites about ePortfolios have influenced your thinking? Why?
19. What aspects of ePortfolios in other schools appeal/do not appeal to you?
20. What documents have you written to address issues or inform people about ePortfolios (e.g., school policy, staff notes, and newsletters)? What documents support your program (e.g., lesson plans and curriculum frameworks)? and
21. What conversations have you had with teachers, parents, and students about ePortfolios?

Introducing ePortfolios into a classroom or school is an opportunity to initiate change.

As with any change, there is a learning and experimentation process that requires determination, time, and effort. Barrett (2004b) offers the following advice for teachers and school administrators:

1. start small and build capacity;
2. develop an action plan that includes:
    a. a vision for the role of ePortfolios;
    b. professional development to provide skills;
    c. incentives to motivate stakeholders; and
    d. provision of resources;
3. work with innovators and early adopters during early exploratory stages;
4. find the natural leaders and engage them in planning;
5. take the team through a change simulation;
6. assess competencies;
7. organize training activities;
8. model ePortfolios; and
9. create an institutional ePortfolio that incorporates elements of individual portfolios (para. 6).

Most importantly, though, it is necessary at some stage to simply make a start and be prepared to learn as the project progresses. As Siegle (2002) says, "a journey of 1000 miles begins with a single step. In the world of [ePortfolios], that single step is a student saving a favorite (sic) story" (p. 63).

2.5 Issue Context

Jonassen (1999) proposes two parts to investigating the context of the issue of the classroom implementation of ePortfolios (see Table 2.1). The first part concerns the performance environment and a description of the physical, socio-cultural, and organisational features of places in which the participants are working and learning. The second part concerns the community of practice and a description of the values, beliefs, socio-cultural expectations, customs, skills and performance backgrounds of the participants. One purpose of the Professional Development Framework (see appendix B) is to provide stimulus questions to ensure that information about the places where the *ePortfolio Project* takes place and the people involved is collected throughout the study. The constructivist learning environment needs to be flexible so that it responds to on-going information about the needs of the participants and the opportunities and limitations of the places where they are learning and working.

The impact of the context on the way people solve problems is exemplified in the comparisons that Brown et al. (1989) make between "Just Plain Folks," students in a classroom, and practitioners in the particular field of endeavour (see Table 2.24).

Table 2.24: Just Plain Folks, Student, and Practitioner Activity

		Just Plain Folks	Students	Practitioners
1.	Reasoning with:	Causal stories	Laws	Causal models
2.	Acting on:	Situations	Symbols	Conceptual situations
3.	Resolving:	Emergent problems and dilemmas	Well-defined problems	Ill-defined problems
4.	Producing:	Negotiable meaning & socially constructed understanding	Fixed meaning & immutable concepts	Negotiable meaning & socially constructed understanding

(Based on Lave, 1988 in Brown et al., 1989, p. 34)

For example, teachers involve students in solving problems associated with the field of biology and attribute lesson content to the literature on biology. However, because of the context and culture of the classroom, the students are presented with well defined problems rather than the ill-defined problems experienced by biologists. These two types of problems can be compared with the emergent problems in biology solved by the everyday person such as treating the fleas on the family dog. People use *everyday cognition* to solve problems using a variety of methods. Their intuitive reasoning is based upon their experiences within a specific context (Choi & Hannafin, 1995). The context of the classroom can be so influential that students may subdue or hide their intuitive reasoning in order to solve a problem in the prescribed manner (Brown et al., 1989).

Brown et al. (1989) say "the activities of a domain are framed by its culture - meaning and purpose are socially constructed through negotiations among present and past members" (p. 34). If a professional development program is to impact on the culturally accepted practices of a classroom, then the program designer needs to understand the influence of the people within the context, the way people solve problems within that context, and the resources available or not available. An investigation of the context in this study will examine the performance environment and the community of practice.

2.6 Performance Environment

Luke says "schools are trying to do too much and not doing it well enough" (Hunter, 2000-2001, p. 137). Consequently the curriculum is overcrowded and not being addressed in sufficient intellectual depth. Middleton and Hill (1996) believe that models of curriculum organization based on discrete subjects are a relic of the industrial era with content taught in allocated times, pedagogy focusing around the teacher, and outputs, like the products of industry, measured for efficiency. Luke (Hunter, 2000-2001) suggests as a consequence, it is subjects that are taught and not children. Cuttance and Stokes (2001a) note that successful teachers in the IBPP focused on children's learning and then adjusted the organization of the curriculum around that focus. In the ACOT project, Sandholtz and Ringstaff (1996) note that teachers were having difficulty in trying to present knowledge that was compartmentalized into discrete subjects. The result was an overcrowded curriculum.

Arredondo and Rucinski (1996) conclude that as teachers became more familiar with an integrated curriculum, they rely less on textbooks and tend to focus on themes and learner outcomes from key content areas, authentic learning experiences and assessment, and collaborative teaching strategies. Learning is more meaningful for children, their interest in learning is enhanced, and a school day is no longer made up of discrete lessons. Arredondo and Rucinski (1996) also found that teachers and principals generally believe an integrated curriculum is an effective strategy to improve children's learning and to develop the school as a learning community. Principals who have successfully implemented an integrated curriculum tend to have "beliefs about the structure of knowledge [that] were less rigid and [they] were more tolerant of the ambiguities they continually face as school administrators" (p. 296). The problem of time for planning in those schools is overcome by incorporating common times for team planning (Arredondo & Rucinski, 1996).

Romberg and Price (1999) define the degree of school restructure as lying on a continuum from *ameliorative* innovation to *radical* innovation. An *ameliorative* innovation is intended to improve the efficiency of practices, but does "not challenge the values and traditions associated with the school culture" (p. 206). On the other hand, the integration of technology has the potential to invite *radical* innovation or shifts in the way people think about and practise education. For example, Davis (2001) speculates on what is a *good* curriculum in the information age where learning in schools is facilitated by technology. She says:

> Boundaries between individual learners, phases and subject disciplines will reduce and possibly disappear . . . [and] a curriculum will be organised along the lines of projects and themes, through which learners develop their values, skills and knowledge in a way that is meaningful to their interests under the guidance of many teachers (p. 44).

She adds that "education may take place in many locations and parents, plus significant others, are likely to play an increasingly important role as support staff and mentors" (pp. 44-45).

2.6.1 Outcomes Approach to Education

One of the issues raised by Luke (Hunter, 2000-2001) is the need for more sophisticated assessment processes because traditional written tests are no longer adequate for the range of areas, skills, and thinking processes children should be expected to attain. Luke (Hunter, 2000-2001) concludes that an outcomes approach to education provides the necessary orientation to align pedagogy, an integrated curriculum, and "authentic assessment systems" (p. 136). Griffin

(1997) highlights the differences between what he calls input-driven programs and outcome-based programs in Table 2.25.

Table 2.25: From Input-Driven to Outcome-Based Programs

Components and Change Criteria	Typical of Input-driven Programs	Typical of Outcome-based Programs
1. Desired outcomes	Non specific, not necessarily observable; typically global statements or lists of decontextualized objectives; transmission of (content)	Specific and observable, representing levels of progress on a continuum; changes in the student
2. Instructional content	Subject matter-based	Outcome-based
3. Time for instruction	Fixed time units (semester, term)	Learner continues until outcome can be demonstrated
4. Mode of instruction	Emphasis on teacher as a transmitter of specialized information	Teacher as a facilitator of learning using a variety of instructional techniques and groups
5. Focus of instruction	What the teacher is able to and likes to teach	What the learner needs to learn to demonstrate outcomes
6. Instructional materials	Narrow source of materials (text or work books)	Variety of text, media and real life materials based on various learning styles
7. Feedback on learner performance	Delayed feedback	Results reported immediately after performance in understandable terms
8. Assessment	Norm referenced assessments based on relative performance of others	Criterion (outcomes) referenced interpretation of assessments indicates progress in terms of outcomes on learning continua
9. Exit criteria	Final assessment in grades or percentages	Learner demonstrates the specified outcomes at prespecified levels on a continuum.
10. Learning emphases	Learner is encouraged to acquire a fixed body of knowledge transmitted under the control of the teacher	Learners need to develop communication, inquiry; conceptualizing, reasoning and problem solving learning skills
11. Learner responsibility	Learner is responsible for following a predetermined course of learning	Learner needs to develop independence and responsibility for self monitoring
12. Context of instruction and assessment	Teaching, learning and assessment are decontextualized to the extent where no prediction of learning is possible	A mix of context and abstract together with application in new and generalized contexts is used to assist in generalizing the student's performance

(Griffin, 1997, p. 8)

2.6.2 The Queensland Curriculum

At the time the study commenced in late 2003, the Queensland education system had implemented an outcomes approach to education. Outcomes stated "in clear terms what students [were] expected to know and to be able to do with what they know . . . at well-defined stages" (Education Queensland, 2002, p. 1). The outcomes to be achieved by children exiting key educational levels at years seven, ten, and twelve, related to the attributes of lifelong learners. A lifelong learner was defined as:

1. a knowledgeable person with deep understanding;
2. a complex thinker;
3. an active investigator;
4. a creative person;
5. an effective communicator;
6. a participant in an interdependent world; and
7. a reflective and self-directed learner (Queensland School Curriculum Council, 2002a, p. 3).

This approach is also consistent with the position expressed by Markuson (1986):

> In a fluid world, we cannot teach many absolutes about information. It is not the tool that is important; it is the process. If we are to produce lifelong learners, then we need to give them the wherewithal to become such - the techniques in addition to the tools, the process, not the product (p. 37).

In Queensland, each key learning area continued to have its own syllabus, but an integrated approach to the teaching of outcomes was thought to take the focus of learning away from the content of discrete subject areas to the teaching of skills and attitudes consistent with the

National Goals of Schooling in the Twenty-first Century (State, Territory and Commonwealth Ministers of Education, 1999). The technology syllabus is an example of this approach (Queensland School Curriculum Council, 2002a). The syllabus expected teachers to take a practical approach to learning in the technology Key Learning Area with an emphasis on problem solving and thinking skills. Subject areas within this Key Learning Area included agriculture, business, home economics, industrial design, and ICT. Common principles and priorities to be implemented across all Key Learning Areas included literacy, numeracy, a futures perspective, and work education, as well as the life skills of personal and social development, self-management, and citizenship. Outcomes described not only what children know, but also what children can do with that knowledge. Teachers were encouraged to recognize the unique views, knowledge, attitudes, values, prior knowledge, and experience of learners. The syllabus reflected these beliefs:

1. Individuals learn in different ways and at different rates, and have preferences for particular settings;
2. Learning is life long and occurs within social and cultural contexts; and
3. Learning is more successful when a partnership develops among students, parents, teachers, and the community, and when it is inclusive and supportive of diversity (adapted from Queensland School Curriculum Council, 2002a, pp. 11-12).

Investigative and learner-centred teaching approaches were also encouraged, with the role of the teacher being one of guiding and facilitating “critical and creative thinking, problem solving and decision making” (Queensland School Curriculum Council, 2002a, p. 12). Knowledge was described in the syllabus as “ever-changing and built on prior experience” (p. 12), and therefore learning should be founded in the construction of meaning in meaningful contexts. Learning should also be challenging and collaborative with an emphasis on children’s ownership of ideas (Queensland School Curriculum Council, 2002a).

As a subject within the technology Key Learning Area, the Queensland ICT syllabus had outcomes organized into three levels under four topics:

1. accessing and constructing digital information;
2. digital communication and publishing;
3. interfacing with machines; and
4. participating in online communities (Queensland School Curriculum Council, 2002b, p.13).

The first of the three levels was an overlap between primary and secondary sectors. Children would typically demonstrate their competence in an outcome through participation in an activity or the design of a product. For example, outcome ACI 5.3 required children to “collect data and construct a simple information system” (Queensland School Curriculum Council, 2002b, p. 26). The design and implementation of databases for a school’s computer or sports equipment would be one way competence in this outcome could be demonstrated.

2.6.3 Essential Learnings

The implementation of an outcomes approach and an integrated curriculum in Queensland established a climate of change, and teachers and school administrators had an opportunity to rethink traditional structures in their schools and be imaginative and innovative about teaching and learning. However, the outcomes approach was short lived. Syllabi implemented in 2002 were obsolete by 2007 and replaced by *Essential Learnings*. The *essentials* are “the key concepts, facts, procedures and ways of working that students need for ongoing learning, for social and personal competence, and to meet complex, real-life challenges” (DETA, 2008). While the Essential Learnings make up the core of the curriculum and “direct teachers on what to teach” (DETA, 2008, para. 1), they are not the whole curriculum. Individual schools make decisions about how the essentials are packaged, and an integrated approach is recommended. Also recommended is an inquiry approach to teaching in recognition of an increasingly complex society that requires students to be able to think creatively and critically. By becoming active investigators and working with a range of information sources, it is thought that students will be able to evaluate data and to use available evidence to draw conclusions that are meaningful (DETA, 2008).

2.7 Community of Practice

A community of practice is a group of people "who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis" (Wenger et al., 2002, p. 4). There are three dimensions of a community of practice that need to be considered:

1. *Domain* defines what a community is about: its source of identity; its major strategic impact; and its enduring significance;
2. *Community* defines who the community is: its key players; its energy for leadership; the roles it needs to achieve its key purposes; its relationships; and its rituals; and
3. *Practice* defines what the community knows: who has this knowledge; who needs it; what is missing; what needs to be documented; and what activities need to be undertaken (Queensland Consortium for Professional Development, 2004, p. 22).

Information about the domain, community, and practice became apparent during the course of the study and is reflected in chapter four which discusses the results and in the data set in appendixes C-F. The researcher was familiar with the context and the community of practice. In the same area where the study took place he had received his primary, secondary, and tertiary education, and served as a teacher for several years and as a principal for 30 years.

The teachers and administrators who participated in the *ePortfolio Project* are experts in what they do, which has implications for the design of learning activities. The literature has important messages about the differences between experts and novices, the types of knowledge possessed, as well as their motivation and openness to innovation.

2.7.1 Characteristics of Experts or Professionals

Bennett, Harper, and Hedberg (2002) define experts as "people with a store of previous cases upon which they draw when confronted with a new situation" (p. 3). For example, when an expert mechanic diagnoses problems with a vehicle he remembers similar problems or cases that he has solved. A novice mechanic would refer to the workshop manual. The relationship between experts and cases will be discussed in section 2.10. According to Glasser and Chi (1988):

1. experts excel mainly in their own domain;
2. experts perceive large meaningful patterns in their domain;
3. experts are fast;
4. experts have superior short-term and long-term memory;
5. experts see and represent a problem in their domain at a deeper (more principled) level than novices;
6. experts spend a great deal of time analysing a problem qualitatively; and
7. experts have strong self-monitoring skills (pp. xvii-xx).

Because the participants already have an understanding of their everyday tasks, the project can focus on creating a learning environment that will enable them to discern new ideas and to develop deeper meaning and understanding (Bereiter, 2002). To achieve this goal, Bereiter (2002) says they "need concepts that allow them to think constructively about issues" (p. 432) such as:

1. why something is worth learning;
2. what different learning objectives actually mean;
3. what is teachable and what isn't; and
4. what is the normal course of developing competence in particular domains (pp. 432-433).

Bereiter (2002) believes taking this approach will "get educators and others out of the two-dimensional world of folk theory and into a three-dimensional world in which it is possible to do fuller justice to the role of knowledge in a knowledge society" (p. 461). Folk theory refers to the assumptions and beliefs that teachers have accepted during a lifetime of being students themselves and teaching in schools. As described in chapter one, these assumptions and beliefs are not easy to change. The *ePortfolio Project* is an opportunity to challenge teachers' beliefs and present alternate views of how expert teachers go about the task of teaching. If experts draw upon a store of cases, then it is logical to build on that store of cases and to challenge cases that exist in the expert's memory. Brew (1993) describes this *unlearning* as not about forgetting but "unravelling the whole and knitting it all up again" (p. 88). The experience generates a new way of thinking or a new aspect of thinking, and we are unable to revert to the original way of thinking. However, Brew (1993) believes experts are adept at prejudging the relevance of a particular way of thinking and need practice at "looking again" (p. 92). This means revisiting issues and being open to seeing new and different practices, a topic that is taken up in the next section.

2.7.1.1 Innovativeness and openness to change

Szabo (2001) describes innovativeness as an abstract concept and suggests it would be inappropriate to consider increasing teachers' capacity to innovate as an outcome of the *ePortfolio Project*. Nevertheless, there are messages in the literature about innovation that facilitators should heed. Szabo (2001) says an innovator is "a dedicated keeper of the dream with total focus" (p. 565). Few teachers in the *ePortfolio Project* will be described in this way though they will share characteristics with those who are. For example, innovation may be seen as a way of testing ideas and discarding those that do not work. This view is appropriate in a relatively new field such as technology, and the even newer field of the classroom implementation of ePortfolios. For this reason Szabo (2001) believes innovativeness is not an end or an outcome but a means to an end. That is, the importance of innovativeness is the process whereby participants are passing through three stages. The first stage occurs when participants are *playing* with ePortfolios and learning about what can be achieved or not achieved with ePortfolios. If participants continue with the innovation they enter the second stage which is *using* ePortfolios to support those tasks that they already do. For example, they may already be taking class photos of excursions but are now organising those photos into folders. Again, if participants continue with ePortfolios they enter the third stage which is using ePortfolios in *creative* ways to support tasks they could not do before or tasks they had not imagined in the second stage.

The two types of innovation described earlier in relation to school restructure (see section 2.6.1) (Romberg & Price, 1999), also apply to the integration of technology and are consistent with a theme expressed in this study. *Amelioration innovation* represents an improvement in a practice without challenging the values behind practice. For example, the slide rule was replaced by the more efficient calculator, but both tools are used in similar ways. On the other hand, a *radical innovation* challenges the cultural tradition that has built up around a practice. The implementation of a positivist ePortfolio would be amelioration innovation, while an ePortfolio built from the constructivist perspective would be a radical innovation.

Innovativeness is sometimes described in terms of a teacher's openness to change (Marcinkiewicz, 1993-94: Baylor & Ritchie, 2001). This is not a particularly useful term in describing characteristics of participants in the *ePortfolio Project*. Participant involvement was on a voluntary basis and if they were not motivated to make changes in their practices they would not have been there. As well, it is too easy to attribute failures in the project to teachers' lack of openness to change instead of seeking other contributing factors. Bober (2001) points out other inherent difficulties associated with abstract terms such as innovativeness and openness to change. She asks "how do you train someone who is both creative and conforming, both independent and a team player?" (p. 23). Participants will need to be all things for all occasions. This raises further questions about whether it is even possible to teach people to be creative or to be a team player. At least some of these characteristics are inborn in the same way that some people are more artistic than others, and other characteristics have been formed at an early age, such as initiative (Bober, 2001). This discussion has not added a great deal to the design of the project, other than to warn against attributing effects to illusory causes and to again highlight the complexities of the issue of professional development for technology integration.

2.7.1.2 Motivation and self-regulation

Ertmer, Newby, and MacDougall (1996) conclude from an exploratory study that key factors in learner-centred instruction such as learning environments and case-based learning are the participants' capacity for self-direction and self-regulation. Learners are faced with difficult tasks, multiple alternatives and information sources, and are required to evaluate the importance of evidence in solving problems. Professionals, though, are noted for their "capacity for self-directed learning" (McLoughlin & Luca, 2000, p. 328). That is, throughout their lifetime, professionals add to their body of knowledge and learn new skills, and experience new situations in which to apply their knowledge and skills. However, the expectation that individuals, even professionals, will be successful in independent self-regulated learning needs to be accompanied by strategies that scaffold the social and participatory aspects of learning (McLoughlin & Luca, 2000). This element of a constructivist learning environment is taken up in section 2.13. Technology has a role in supporting social and participatory aspects of the *ePortfolio Project* by facilitating communication. In keeping with the principle of *teaching the teachers as we would have them teach*, participants may apply the same technology to enhance social and participatory aspects of classroom projects.

Keller (1983) expresses a concern that participants are expected to be motivated by the quality of the instruction. That is, the success of learning projects is usually measured in terms of how well participants have met outcomes, rather than the number of participants who were motivated to complete the projects. Ertmer et al. (1996) agree, and draw on the previous work of Blumenfield, Soloway, Marx, Krajcik, Guzdial, and Palincsar (1991) in proposing that instructional designers need to consider four elements. The first element is the participants' interest in the project. Keller (1983) defines *interest* as the arousal of curiosity. Participants indicate their interest by their desire to know more about the topic and to be involved in new experiences, and by their positive reaction even though the topic is unfamiliar or even incongruous (Maw & Maw, 1968). Berlyne (1965) goes so far as to recommend that presenting situations that are novel, complex, and incongruous is a strategy that will trigger the interest of a participant. Keller (1983) provides two warnings for instructional designers. First, learners need to be comfortable with the risks involved when they pursue their interests. Second, there is an optimal level of motivation, and considering that there is frequently too little motivational interest, offers the following strategies:

1. Use novel, incongruous, conflictual, and paradoxical events. Attention is aroused when there is an abrupt change in the status quo;
2. Use anecdotes and other devices for injecting a personal, emotional element into otherwise purely intellectual or procedural material;
3. Give people the opportunity to learn more about things they already know about or believe in, but also give them moderate doses of the unfamiliar and unexpected;
4. Use analogies to make the strange familiar and the familiar strange; and
5. Guide students into a process of question generation and inquiry (pp. 401-405).

The second element identified by Ertmer et al. (1996) concerns the participants valuing the project as a worthwhile activity. Keller (1983) recommends three strategies to enhance this element that he describes as *relevance*. First, participants have a need to exercise power and control which facilitators can address by providing choice in activities, by allocating responsibilities for tasks, and allowing one participant to influence another. That is, facilitators should at times take a step back and allow participants to take the role of facilitating. Second, participants have a desire to achieve, and facilitators should ensure that all participants are succeeding in at least some tasks that involve moderate levels of risk. Third, participants have a need to belong to a group, and facilitators need to build trust and include opportunities for interaction that involve no risks. Keller and Kopp (1987) add a further three strategies. First, to build familiarity between participants and facilitators, language should be concrete and examples should relate to the participants' own experiences. Second, participants should be aware of the goals of the project and clear links should be established with benefits to their classroom practices. Third, facilitators need to understand participants' motives for joining and continuing in the project and must be prepared to use strategies that are consistent with that motive. For example, teachers and school administrators who volunteer to participate in the *ePortfolio Project* should be afforded a particular status as motivated professionals who have identified a need to address. Given this status, there is also an expectation that participants will be co-operative, willingly support other professionals, and be reflective of their practices.

The third element identified by Ertmer et al. (1996) is the participants' perceptions of their ability to successfully meet the goals of the project. Care will need to be taken not to overwhelm participants in the *ePortfolio Project*. This reinforces the discussion in section 2.4.6 that suggests teachers implement ePortfolios in manageable stages. Keller (1983) recommends that participants are made aware of what they need to achieve in order to be successful and how success will be evaluated. Participants will also need feedback on their progress. Keller and Kopp (1987) add that levels of accomplishment should be apparent, which is a further reason for including the stages of ePortfolio development in the information booklet (see section 2.4.6).

The fourth element identified by Ertmer et al. (1996) is the need to focus on the processes of learning and not just the project outcomes. The questions in the Professional Development Framework (see appendix B) that guide the development of the constructivist learning environment are based on this premise. Keller and Kopp (1987) add that participants need opportunities to practise new knowledge and skills in a simulated situation or in the classroom.

2.7.1.3 Types of professional knowledge

The final section on understanding experts and professionals relates to the nature of their knowledge. McLoughlin and Luca (2000) analysed the content of an online team-based problem solving project to gather evidence of three types of professional knowledge proposed by Eraut (1994) (see Table 2.26).

Table 2.26: Types of Professional Knowledge

Type of Knowledge	Definition	Examples of Knowledge found in Transcripts
1. Propositional Knowledge	a. Discipline based concepts; b. Generalisations and practical principles; and c. Specific propositions about cases, decisions and actions.	a. Storyboarding skills; b. Project planning; c. Design specifications; d. Record keeping; and e. Hardware software knowledge.
2. Process Knowledge	a. Acquiring information; b. Skilled behaviour; c. Deliberative processes; d. Giving information; and e. Controlling one's behaviour.	a. Negotiation skills; b. Communication; c. Evaluation; and d. Roles of team members.
3. Personal Knowledge	a. Interpretation of experience; b. Understanding of assumptions; and c. Self-evaluation of competencies.	a. Self-awareness; and b. Self-assessment of skills.

(McLoughlin & Luca, 2000, p. 334)

McLoughlin and Luca (2000) believe it is important to understand and acknowledge the three types of knowledge because each must be addressed by strategies in a learning project. The examples on the right hand side of Table 2.26 provide a guide for facilitators about the range of strategies that relate to each knowledge type. As well, it is easy for facilitators to assume that participants have well developed knowledge in each of these areas, whereas additional support may need to be considered for identified individuals.

2.7.2 The Role of School Administrators

The community of practice involved in the *ePortfolio Project* includes school principals and other school administrators who have important roles in the classroom implementation of ePortfolios. Ainley, Banks, and Fleming (2002) argue that the provision of technology resources needs to be supported by a focus on teaching and leadership. Baylor and Ritchie (2002) add:

> Administrators who promote the use of technology, not only in words but in actions, lend credence to a technology culture. . . . By helping teachers find ways to actively infuse technology, investments in time and money will pay off in greater content acquisition and higher-order thinking skills for students and greater teacher competence and morale (pp. 412-413).

The roles that school administrators have in supporting and guiding teaching and learning with technology in their schools include:

1. the development and communication of a vision;

2. the planning and implementation of policy;
3. modelling the use of technology;
4. modelling the teaching of technology;
5. managing resources; and
6. co-ordinating staff development (Meltzer & Sherman, 1997; Gibson, 2001; Hope, Kelley, & Guyden, 2000; Bennett, 1996; Mize & Gibbons, 2000; Baylor & Ritchie, 2002).

2.7.2.1 Development and communication of a vision

Administrators need to develop and communicate a clear vision of education and the role of technology in education (Mize & Gibbons, 2000; Bennett, 1996; Hope et al., 2000). According to Meltzer and Sherman (1997), a vision of teaching and learning goals will guide decisions about staff development, incentives for teachers to change practices, assessment of student learning, supervision, staffing, resource management, access to technology, and maintenance. Elements of a vision that may be considered include: (a) the teaching approach; (b) the role of technology in the administration of the school; (c) justification for having computers in a lab or in classrooms; and (d) how technology is used (Meltzer & Sherman, 1997). A vision must also demonstrate an awareness of existing practices in the school, community, and outside world, and include past successes and new initiatives (Gibson, 2001). The effectiveness of a vision will be limited by how well it is articulated, and for Bennett (1996) this means the message must be strong, repeated, communicated to all stakeholders, and focus on improving learning processes.

2.7.2.2 Modelling the use of technology

Administrators may convey both positive and negative messages to staff, children, and the community by their participation or lack of participation in new practices (Bennett, 1996; Hope et al., 2000). Opportunities to demonstrate that they too are risk takers should be embraced (Gibson, 2001), and through personal participation they will gain a better understanding of what is needed to enhance success (Meltzer & Sherman, 1997). By talking with teachers, parents, and children and by experiencing the same problems associated with change, administrators build relationships and the confidence of the school community (Meltzer & Sherman, 1997). Administrators therefore need to be computer literate (Meltzer & Sherman, 1997; Bennett, 1996), have an awareness of the capabilities of technology, understand the roles and uses of technology, and be able to provide technical assistance and solve problems (Hope et al., 2000).

Mize and Gibbons (2000) believe the integration of technology should be communicated by example rather than mandated. Administrators are able to demonstrate their competence in technology during the daily management of their school. For example they could:

1. use a spreadsheet to prepare a school budget;
2. understand the legal and ethical issues related to technology licensing and usage;
3. purchase up-to-date hardware and software;
4. understand how current technologies can be effectively integrated into teaching and learning;
5. provide basic technical assistance;
6. facilitate teachers' professional development to use technology;
7. use presentation software to enhance communication skills;
8. research school improvement using the World Wide Web; and
9. use a word processor, spreadsheet, database, and communication applications (Hope et al., 2000, p. 370).

Pfennig (1994) surveyed 805 principals to compare their mean score in computer related tasks and instructional leadership behaviours. Pearson Correlation Coefficients and t Tests were used to analyse 15 variables. The principals' use of technology to manage school finances had a moderate relationship with the instructional climate of the school. A significant relationship was reported between the use of technology by secondary principals and their instructional leadership, particularly for older and more experienced principals. This study supports earlier suggestions that administrators should model the use of technology in their everyday work.

2.7.2.3 Modelling the teaching of technology

Meltzer and Sherman (1997) believe administrators “must provide practical models of what, when, how, and why to use technology” (p. 28). There is no suggestion that the “practical models” are demonstrated personally by the administrator, but rather through a “successful professional development [program which] provides examples, identifies potential, and gives teachers opportunities to use and explore possibilities” (p. 28). However, Baylor and Ritchie (2001) say administrators “lend credence to a technology culture” (p. 2671) if they go beyond endorsing technology with words, to “actively use, model, and reward teachers who infuse technology into their classroom” (p. 2671).

Bisceglia (1990) administered a self-report questionnaire by mail to 76 leaders in 14 school districts. The leaders varied from school board members and superintendents, to principals and computer teachers. The study concludes that the leader’s knowledge of teaching with technology influences their style of leadership and the extent of children’s use of technology in learning. Rogers (2000) developed a 75-item survey instrument for a study of 558 teachers in 22 elementary schools. Pearson product-moment correlations were used to analyse the teachers’ perceptions of their principals’ support of technology integration, the teachers’ participation in professional development, and the availability and technical support of technology. A strong correlation was found between the teachers’ perceptions of their principals’ support of technology integration and the teachers’ perception of their progress in integrating technology, and between the level of professional development activity and the integration of technology.

2.7.2.4 Planning and implementation of policy

Long term planning is important because the integration of technology, including the classroom implementation of ePortfolios, could take three to six years (Meltzer & Sherman, 1997). Technology plans commonly include a vision statement, mission, goals, roles, timelines, responsibilities, inventories of hardware, software and infrastructure, current technology practices, teacher skill levels (Gibson, 2001), staff development, technical support, and equipment upgrade program (Hope et al., 2000). Gibson (2001) recommends an evolving five-year technology plan with an annual review as part of the school improvement plan.

As argued in chapter one, Meltzer and Sherman (1997) believe administrators should ensure new policies are meeting the requirements of new demands, and in doing so, look beyond measures of success in terms of student/computer ratios or the establishment of local area networks (LANs) to address issues such as instructional priorities. Bennett (1996) agrees success should be measured in terms of how well technology has been integrated into the curriculum and how well students are progressing in developing computer literacy. Gibson (2001) adds that planning should take into account the need to encourage teachers to take risks, to undertake their own research to explore possibilities, to evaluate practices, and to indulge in some “dreaming” (p. 3) of what might be.

Establishing a technology planning committee is one of many strategies to involve teachers in the process of setting goals and long-range planning (Bennett, 1996). Plans may also be used to highlight deficiencies in resources and therefore support advocacy for hardware, software, and training. A strategy associated with advocacy is for administrators to look beyond their own schools and seek to influence district and state technology plans. The expertise of businesses, partnerships within the community, and applications for grants could also be part of a school’s plan to enhance the development of technology (Gibson, 2001).

2.7.2.5 Managing resources

Principals may improve access to technology for teachers and children (Bennett, 1996) through budget management, advocating for additional funds from the parent body and grants, implementing student fees, and allocating maintenance personnel (Gibson, 2001). Principals may plan for the systematic replacement of hardware and software (Meltzer & Sherman, 1997) and promote consistency of configurations and platforms (Gibson, 2001). Principals are also able to co-ordinate the development of infrastructure by attending to logistical issues such as wiring, power, space, and security (Gibson, 2001).

According to Meltzer and Sherman (1997), principals should ensure equipment is fixed in a timely manner by either personally attending to maintenance issues or by implementing a maintenance scheme through existing school staff, an on-site technician, or contracted services from outside the school. Gibson (2001) does add a proviso that the aim should be to empower staff in addressing their technology problems. Teacher incentive to change practices may be lost if access to hardware or software is restricted or limited by equipment failure (Meltzer & Sherman, 1997). On the other hand, the use of technology is encouraged when the capacity of equipment is expanded to allow wider functions such as accessing local area networks (LANs) and telecommunications (Gibson, 2001).

2.7.2.6 Staff development

Gibson (2001) believes administrators need to be aware of teacher resistance to change, and not only why teachers resist change but also the various forms of that resistance. Some teachers will be motivated to use technology by improvements in children's achievement (Hadley & Sheingold, 1993; Cuttance, 2001a). Other teachers will have genuine difficulty in making the transition to integrating their practices with technology. Administrators need to implement different change strategies to support those teachers (Gibson, 2001), and professional development programs will need to take into account different adult learning styles (Meltzer & Sherman, 1997). Teachers who have adapted quickly to technology or who have special interests in technology should be encouraged or trained to take on leadership or mentor roles in the school (Gibson, 2001). Incentives need to be developed to encourage teachers to become more involved in learning about technology and implementing technology in their classrooms (Gibson, 2001). For example, teachers could be allowed to borrow equipment (Meltzer & Sherman, 1997).

To create a climate in which teachers feel supported and risk taking is encouraged (Gibson, 2001; Mize & Gibbons, 2000), administrators may ask teachers to share their experiences (Bennett, 1996) and celebrate their successes (Gibson, 2001). Experimentation by teachers could be perceived by their peers as a waste of time and resources, and it is important that these teachers are seen to have the support and backing of the administration (Meltzer & Sherman, 1997). Teacher experimentation and innovation should be regarded as critical in the process of developing unique applications in the relatively new field of supporting learning with technology (Meltzer & Sherman, 1997). Teachers need to feel they are in a stable environment if they are going to expose themselves to risk and to critical evaluation by children and staff. Therefore, "low teacher turn over rate may be a strong indicator of schools that may be ready for the integration of technology" (Mize & Gibbons, 2000, p. 2037).

Networking and collaborating with fellow teachers on staff and in other schools is an important process in effecting change (Gibson, 2001; Bennett, 1996). Not only are the opinions and practices of peers a powerful source of influence, but also by networking teachers are exposed to national and international trends, issues, and innovative projects (Gibson, 2001). Technology may facilitate this process through email, bulletin boards, and discussion groups (Bennett, 1996), and in this way teachers are modelling the type of networking they should be encouraging with children. There is an opportunity for administrators to be part of this peer networking process so they become known in the school as a source of expertise, ideas, and documents (Gibson, 2001). The traditional staff meeting is also an appropriate forum to share insights, strategies, successes and failures, and to set goals (Bennett, 1996). Some teachers find that physically visiting other schools is another useful approach to networking and sharing (Gibson, 2001).

Carlson (1994 in Meredyth et al., 1999) agrees with earlier statements "that more than any other single factor, teachers' beliefs influence what they do in the classroom" (p. 259), including beliefs about children, teaching, technology, and what teachers envisage as being exemplary teaching with technology. School administrators have a role in supporting professional development initiatives that challenge the beliefs of teachers. For example, they could:

1. assist teachers to uncover their personal beliefs about teaching;

2. encourage teachers to describe their experiences with information technology and the assumptions they have about information technology;
3. allow time for reflections;
4. probe for deeper understanding;
5. encourage teachers to go beyond 'fitting in to the curriculum' when they design information technology activities; and
6. help teachers to identify persistent difficulties within the curriculum, topics with which students consistently have problems as these could be productive places to begin to apply information technology (p. 259).

2.7.3 The Beliefs of Administrators

The development and communication by administrators of a vision is a key role, which impacts on each of the other five roles. That is, administrators' beliefs about teaching with technology and their vision for technology integration influence their planning and the way they model the use of technology, manage resources, and prioritize staff development. The beliefs and understandings shared among members of a school community are a central element of Hill and Crévola's (1997) whole-school design approach to develop effective teaching and learning. Of interest to this study are the beliefs and understandings that administrators contribute to the process. If administrators are to reveal, share, or promote their beliefs and understandings, then their inclusion in the professional development program must be considered important (Hill & Crévola, 1997).

Cuttance and Stokes (2001b) observed in the IBPP that the role of leadership became more apparent when innovations were complex and had to be co-ordinated across a large staff. As well, teachers were under a great deal of pressure when they changed from traditional information transmission teaching to a learner-centred approach, and not only were administrators observed articulating "philosophical and educational foundations" (Cuttance & Stokes, 2001b, p. 189), but were also seen to support teachers who were prepared to take risks.

The roles of administrators in the integration of technology in classrooms have implications for this study of ePortfolio implementation. First, administrators clearly have important roles, not only in the provision of technology infrastructure, but also in leading change to achieve more effective uses of technology in teaching and learning. Second, the roles are complex and interconnected, and a focus on just one or more of those roles limits the integration of technology. The conclusions by Meredyth et al. (1999) from their study of Australian schools support this view. For example, the application of technology may be reduced to being a useful productivity tool unless consideration is given to curriculum organization and pedagogy. The third implication for this study is the need to take into account the beliefs of administrators. If administrators change their beliefs, it is through each of their six roles that they will be able to influence teaching and learning in their schools.

2.8 Representation of the Issue

The issue has to be represented in a way that will arouse the interest of teachers and school administrators. Jonassen (1999) uses the term "perturbing the learner" (p. 221), which describes the disturbance in the participants' minds about the practices they are currently applying and the potential of new practices. It is this disturbance and the desire to resolve the problem which drives the learning (Jonassen, 1999). In the *ePortfolio Project*, for example, an explanation of the concept of ePortfolios would need to convey enough information so participants could appreciate the advantages of implementing ePortfolios and also gain an insight into the problems to be solved along the way. It would be counterproductive to present just the positive aspects of ePortfolio implementation, only to have participants withdraw if their expectations are not met. The level of interest and enthusiasm generated from the presentation of the issue should be sustained through to the learning phases, but nevertheless must be encouraged during activities.

Jonassen (1999) suggests that representing the issue as a narrative in the form of text, audio, or video is a low cost and effective method. Staudt and Fuqua (2001) highlight the advantages of a video presentation in that sections of particular interest to the participant can be replayed. Although their study involved pre-service students, Abell, Bryan, and Anderson (1998) conclude that presenting video cases is a powerful way to perturb thinking, and is particularly useful in conveying the implicit and complex nature of teaching as well as presenting problematic situations that reveal inconsistencies in teachers' beliefs and challenge the theories on which they base their practice. .

2.9 Issue Manipulation Space

The issue manipulation space is the final section relating to the issue and concerns the activities organized for participants (see Table 2.1). Activities in the *ePortfolio Project* should simulate the real world of the classroom, including physical, organizational, cultural, social, political, and power issues. Activities are designed so that participants learn about the objects, signs, and tools they need, for example, to implement ePortfolios (Jonassen, 1999). Learning needs to be embedded in realistic, authentic, relevant, and context-sensitive activities (Honebein, 1995; Jonassen, 1993a; Savery & Duffy, 1995; Duffy & Jonassen, 1992; and Jonassen, 1994). Savery and Duffy (1995) add that the learning environment should also reflect the complexity of the environment in which the learning has to be applied. Aspects of this statement though may be arguable, in that a teacher, for example, may prefer to learn a new skill without the distraction of a complex environment. However, the point being made by Savery and Duffy (1995) is that in traditional transmission instruction learning is passive, whereas Perkins (1992) agrees that from the constructivist perspective learning occurs when learners are confronted with information that creates in their minds an inconsistency with what they knew before. This confrontation requires high levels of thinking by the learner because they have to derive new plans and new models of working, which is only likely to occur in response to a complex situation. A way of achieving this effect is to ensure that activities relating to the development of a discrete skill are anchored to a larger activity or problem (Savery & Duffy, 1995).

Constructivists believe that instructional design modelled on their perspective will be more effective in developing the ability of learners to transfer new knowledge and skills to solve new problems because activities involve the real-life problem solving described above (Choi & Hannafin, 1995). For example, Jonassen, Mayes, and McAleese (1991) believe the usefulness of knowledge is related to the extent that knowledge can be applied in new situations. Activities should therefore require learners to apply newly learned knowledge and skills to solve problems. Brown et al. (1989) argue that it is not effective to substitute activity with a description of an activity, because it is the actual engagement in the activity that leads to improved transference of knowledge and skills to new situations. Stories, on the other hand, do have a role in transfer because they encapsulate the knowledge and skills that learners have gained through experience, and are a common method of sharing meaning (McLellan, 1996).

2.9.1 Metacognition and Reflection

There are two meanings that can be attached to the word *reflection*. In the first meaning, reflection is seen as a metacognitive strategy (Jonassen et al., 1991). Lin (2001) defines metacognition

> as the ability to understand and monitor one's own thoughts and the assumptions and implications of one's activities. Students are said to be metacognitive to the degree to which they are engaged in thinking about themselves, the nature of learning tasks, and the social contexts. (p. 23)

In the second meaning, reflection is seen as "a form of deliberation" (Eraut. 1994, p. 156).

Schön (1983) highlights the importance of practitioners taking time for reflection so they may

> surface and critique the tacit understandings that have grown up around the repetitive experiences of a specialized practice, and can make new sense of the situations of uncertainty or uniqueness which [the practitioner] may allow himself [or herself] to experience. (p. 61)

Reflection is a key aspect of knowledge construction and meaning making (Honebein, 1995) and an integral part of the actions that occur in the activities in the manipulation space described above. Argyris and Schön (1974) describe this process as "integrating thought with action" (p.

3). They argue that "all human beings - not only professional practitioners - need to become competent in taking action and simultaneously reflecting on this action and learning from it" (p. 4). Schön (1987) believes this is achieved through "learning by doing, coaching rather than teaching, and a dialogue of reciprocal reflection-in-action between coach and student" (p. 303). In the *ePortfolio Project*, the latter means that participants should hear about and observe ePortfolios at a workshop, go back to their classroom and design ePortfolio frameworks suitable for their classroom , i.e., "testing the meanings [they have] constructed" (p. 101), and then present their ePortfolio frameworks to the facilitator and other participants. Through this process participants verify their learning and ask if their interpretation is appropriate, and they should be attuned to further suggestions by the facilitator or group.

The goal of reflection is "to help practitioners discover what they already understand and know how to do" (Schön, 1991, p. 5). This is particularly relevant in the *ePortfolio Project* because the participants are already expert practitioners. The project can therefore focus on supporting the participants and help them to assemble their existing knowledge about how children learn into new ways of teaching. The process of reflection described by Schön (1987; 1991) is congruent with other strategies in the project such as case-based reasoning and embedding learning in authentic and context-sensitive activities. Schön (1987; 1991) also recognises the potential of stories and cases in conveying meaning.

Boud and Walker (1993), though, warn of barriers that could arise when learners are expected to reflect upon their experiences, such as:

1. not being in touch with one's own assumptions and what one is able to do;
2. lack of self-awareness of one's place in the world;
3. established patterns of thought and behaviour;
4. past negative experiences;
5. threats to the self, one's world view, or to ways of behaving;
6. hostile or impoverished environments;
7. lack of opportunity to step aside from tasks;
8. lack of support from others;
9. intent which is unclear or unfocused;
10. inability to conceive of the possibility of learning from experience 'this is not learning';
11. stereotypes about how we learn; and
12. obstructive feelings - lack of confidence or self-esteem, fear of failure or the response of others, unexpressed grief about lost opportunities (p. 79).

As a counter to these issues, Lin (2001) proposes five aspects of a supportive social environment that can be created to promote metacognition:

1. create a metacognitive culture where people feel comfortable to acknowledge what they do not know;
2. use a systems approach to design metacognitive activities;
3. everyone to take on a helpful and intelligent role in a community;
4. help students develop deep learning principles that can apply across different curricula and domains; and
5. support diversity and metacognitive discourse in a community (p. 28).

The questions in the Professional Development Framework (see appendix B) that guide the design of a constructivist learning environment provide the shell for a systems approach to considering metacognitive activities. For example, the sharing of cases promotes the concept of a collaborative community of practice who are encouraged to feel comfortable in articulating their thinking. Participants are invited to take on different roles within the community, including the presentation of sessions on skills they have developed or in supporting colleagues. Participants will need opportunities to reflect on the content of the *ePortfolio Project* and also the learning processes (Savery & Duffy, 1995), including the various aspects of designing a constructivist learning environment. Reflection is a key process in ePortfolios, and participants will need to consider their own metacognitive efforts in order to gain insights into the higher levels of reflection that can be achieved.

2.10 Related Cases

The second element of a constructivist learning environment is called *related cases* (see Table 2.1). This element involves the collection of cases of how practitioners have addressed the issue. The discussion relates how a case begins as a story and how stories are translated into cases. A number of cases together make a case library that a learner may draw on when faced with a new situation (Jonassen & Herandez-Serrano, 2002). The interaction between the library of cases and the learner is part of a process called *case-based reasoning*. The cases contribute to the stored experiences in Figure 2.1, and are a written record of an organization's memory.

2.10.1 Story

Bielenberg and Carpenter-Smith (1997) define story "as the interaction of action, character, conflict, and genre which creates a pattern of tension and release that the audience finds enjoyable" (p. 152). A story is a record of an event that includes characters in a setting. Within the event is a sequence of significant happenings that the listener, reader, or viewer of the story can interpret as a plot. By understanding the plot, the characters, and the setting as a whole, people can interpret the causes of happenings (Carter, 1993; Danzig, 1997). Hernandez-Serrano and Jonassen (2003) suggest that listening to stories about events "is tantamount to experiencing the phenomena oneself" (p. 104). Bruner (1990) adds that the processes involved and the effect of a story are the same regardless of whether the story is based on an actual event or is imaginary.

One of the strengths of using story as a learning tool is that "stories are the oldest and most natural form of sense making among humans" (Jonassen & Herandez-Serrano, 2002, p. 66). Bruner (1990) believes humans have "a readiness or predisposition to organize experience into a narrative form, into plot structures and the rest" (p. 45). Human predisposition for story is consolidated through the fairy tales we are told while growing up, the stories we read and listen to in school, and by watching television. We are encouraged from an early age to relate stories about events to people who were not at the event (Polkinghorne, 1988). Atkinson (2002) says "we think in story form, speak in story form, and bring meaning to our lives through stories" (p. 121).

The capacity of humans to share stories contributes to a stable society because people are connected by the stories they tell (Bruner, 1990). Bruner (1990) describes this phenomenon as walking on to the stage of a play that has already started. The stories we are told reinforce our understanding of the world around us and the part that we play (Atkinson, 2002). The effect of stories on people's culture is important to this study because a goal is for new practices and beliefs to become accepted within the culture of teaching. Wang, Jonassen, Strobel, and Cernusca (2003) say "if you want to experience the importance of stories to teaching, then visit any teacher's lounge in any school for even a short time" (p. 549). A story is also a format that captures the complexities of teaching in a way that is rich in information but easy to understand (Carter, 1993).

There are at least five uses of stories as a learning tool. First, stories can transmit information as simple as how something works or the more complex application of conveying the meaning behind an event, e.g., reasons why the event occurred, why the event occurred as it did, and what would need to happen to prevent the event from occurring again (Carter, 1999). Second, retelling a story or committing the story to paper promotes reflection about an event and more importantly, encourages a person to consider their understanding of theory associated with the event. That is, story can provide a link between theory and that theory in action (Danzig, 1997). Third, story can take the form of a scenario to support logical thinking about *what if*, e.g., a person can substitute responses in the story and apply their logic to predict how outcomes will be different (Polkinghorne, 1988). Fourth, recounting an event in the form of a story "encourages others to listen, to share, and to empathize" (Riessman, 2002, p. 697). This connection between the story teller and the story receiver makes story a powerful tool that goes beyond the transmission of information to the sharing of personal beliefs. Fifth, story is not just a passive medium, but has the potential to initiate and guide action (Drake, Spillane, & Hufferd-

Ackles, 2001; Atkinson, 2002). For example, a story about an event in which a child is bullied may lead to a review of the school's bullying program.

Each of these uses of stories has applications in this study. However, it is the relationship between stories and constructivist theories that is of particular relevance. Carter (1999) says "much of what we know and understand is embedded in stories" (p. 171). But it is not a simple process of telling a story and having the knowledge accepted by the listener. The process of "negotiating and renegotiating meanings by the mediation of narrative interpretation" (Bruner, 1990, p. 67) is a key concept in constructivist theories about learning. The implication for this study is that the recording of a story about a teaching practice is only the beginning of the learning process. For example, the listener will need to reflect on the meaning of the story, discuss and challenge the meaning of the story with others, visualize the events of the story taking place in their own context, and adapt actions accordingly. This adaptation of what other people have related is part of the case-based reasoning process explained later. Furthermore, the expert teaching practitioners participating in this study face complex problems (Danzig, 1997) and story facilitates the steps in logic required to comprehend an extraordinary event (Bruner, 1990).

2.10.1.1 Stories in the workplace

The role of story in the workplace was investigated by Orr (1996) in an ethnographic study of Xerox photocopy technicians. In one vignette in which the technicians meet for breakfast before moving out to jobs, Orr (1996) highlights the volume of talk and the number of topics discussed:

> They talk about the work they have done, the work they are currently engaged to do, and the work they are going to do in the future. Besides work, they discuss friends, lunches, cars, and traffic cops. The world of their discourse is a rich and complex one, full of nuance, and their stories and partial stories add detail and color (sic) to particular portions of this world. (Orr, 1996, pp. 19-20)

The on-the-job experiences that the technicians share with each other are referred to as *war stories*, and relate only sufficient contextual information such as the model of the machine and technical detail as deemed necessary by the teller to impart the message (Orr, 1996). That is, a lot of common understanding between technicians is assumed. Morris (1995) believes that while experts may find it difficult to explain their reasoning behind what they do to solve complex problems, they are able to relate their experiences as *war stories*. Important for this study about the classroom implementation of ePortfolios is that an experience retold as a *war story* is a format that experts are usually willing to share. From his observations, Orr (1996) concludes that stories:

1. originate in problematic situations and are told and retold in diagnosis when the activity they represent becomes problematic again;
2. preserve and circulate hard-won information;
3. [make] past problematic circumstances . . . [public] and collaboratively inspectable by one's peers;
4. amuse, instruct, and celebrate the teller's identity as technicians;
5. of more or less similar experiences is a way of pushing the facts around, trying other perspectives;
6. combine facts with context;
7. [warn] that failure to remember the sometimes invisible or illogical connections between symptoms and causes may add hours of unnecessary diagnostic activity; and
8. express a moral attitude (pp. 125-143).

Orr (1996) adds:

1. wishful thinking leads the technicians to tell stories about causes they would like to find; and
2. different versions of the story [reveal] variations in the way technicians understand machines (pp. 125-143).

Bielenberg and Carpenter-Smith (1997) report a study to investigate the value of story in computer based adult education. Andersen Consulting Education used story as an instructional strategy to create learning experiences in a multi-media training course for 30 000 employees of the parent company Anderson Consulting. Bielenberg and Carpenter-Smith (1997) conclude that "story created a learning experience that integrated motivation, detailed content, and cultural content messages" (p. 158). Learners were motivated by empathy with the protagonist, by curiosity about what was to happen next in the story, and through engagement in the conflict, tension, and climax of the story. Content was embedded in stories that related to the personal experience of the learners. The stories therefore became a structured memory store that the learner could retrieve. This was a particularly powerful tool in conveying the more subtle messages about cultural aspects of the company.

Hernandez-Serrano and Jonassen (2003) developed a library of 24 stories told by experts for a course for students intending to be employed in the food industry. The scenario for the stories was the introduction by the Nestlé Refrigerated Food Company of two new pasta products. Hernandez-Serrano and Jonassen (2003) conclude that while telling and listening to stories is intuitive, this format of learning is so different from methods used in the formal classroom that students need practice. In particular, students did not have the skill of analogical reasoning to be able to connect stories to problems. On the other hand, teachers as expert practitioners are familiar with using stories as an everyday strategy to solve problems. This is further evidence of the differences between experts and novices discussed earlier, and the need to understand the learner as proposed in the design of a constructivist learning environment. Chambers (2000) recognised the potential of teachers' familiarity with story and established a data base of teacher stories about using technology, e.g., creating a spreadsheet of children's birth dates. She presented the stories as cases in portable document format (PDF) on CD-ROM and teachers could use keywords to locate cases of interest. The process of developing cases from stories is the topic of the next sections.

2.10.2 Cases

Kolodner and Leake (1996) define a case as "a contexualised piece of knowledge representing an experience that teaches a lesson fundamental to achieving the goals of the reasoner" (p. 36). A case is able to teach a lesson because it "chunks together information concerning problems, responses to those problems, and effects of those responses" (Kolodner, 1996, p. 354), and because it "chunks" together the information in a different way to other formats (Kolodner, 1996). That is, a case is an integration of many elements including:

1. a description of the context;
2. a description of some problem or question or failed expectation that arose in that situation;
3. a description of the way that problem or question was addressed or the way the failed expectation was explained; and
4. a description of the consequences, results or outcome of addressing the problem in that way (Kolodner, 1996, p. 353).

A case is concrete in that it is based on a real experience, and if not a real experience then an experience that could plausibly be real. A case connects the reader to an experience in a way, as suggested earlier, that is similar to the reader having that experience (Kolodner, 1996).

Using a case as a learning tool can teach:

1. how to achieve a goal;
2. how to achieve several goals in conjunction;
3. the circumstances in which a set of steps for achieving a goal can be carried out successfully;
4. how to bring about the state required for achieving some important goal;
5. the kinds of problems that might arise in achieving a goal (what might go wrong); and
6. the effects of an action (Kolodner & Leake, 1996, p. 37).

The value of a case increases if it refers to a new way of achieving a particular goal, and there are two types of cases used in this way (Carter, 1999). The first type of case is an exemplar, e.g., to demonstrate a new practice. This type of case, while depicting the complexities of teaching, avoids problems associated with the new practice and is intended merely to demonstrate the processes involved. The second type of case addresses problems associated with the new practice, and is intended to stimulate reflection. Shulman (1986), on the other hand, relates types of cases to the three types of propositional knowledge of teaching:

1. prototypes exemplify theoretical principles;
2. precedents capture and communicate principles of practice or maxims; and
3. parables convey norms or values (p. 11).

Shulman (1986) explains that a single case may be associated with more than one type of knowledge. These descriptions of cases highlight their practical applications.

Schuwirth, Blackmore, Mom, van den Wildenberg, Stoffers, and van der Vleuten (1999) provide a guide for writing cases:

1. use the representation of real [people];
2. ensure that the description of the information is as clear as possible;
3. provide sufficient realistic . . . contextual information;
4. provide sufficient negative information; and
5. provide information that is not pre-interpreted (‘raw’) (p. 149).

Cases that are to be used as a reflective tool in problem solving should:

1. link the problems directly to the case;
2. avoid problems or possibilities that do not exist in real practice; and
3. focus on essential problems only (p. 149).

Schuwirth et al. (1999) suggest it is also good practice to have the case previewed by practitioners before applying the case in a learning situation.

2.10.3 A Case Library

Colaric, Turgeon, and Jonassen (2002) define a case library as “a collection of historical cases or stories arranged in such a way as to allow access to cases that are relevant to the user at a particular time” (p. 64). Case libraries can provide multiple perspectives and interpretations of complex issues (Hernandez-Serrano & Jonassen, 2003). According to cognitive flexibility theory (Spiro & Jehng, 1990) as explained earlier, information relating to an issue is resistant to over-simplification if it is presented from various perspectives and is derived from different contexts. That is, “knowledge that will have to be used in many different ways has to be represented in many different ways, with the potential to form various combinations with other aspects of knowledge as required by new contexts of knowledge use” (p. 165).

Similar to the traditional notion of a library the case stories and elements of the case stories are catalogued or indexed to facilitate retrieval (Jonassen & Herandez-Serrano, 2002).
The four steps that Jonassen and Herandez-Serrano (2002) propose in building a case library will be applied in this study of the classroom implementation of ePortfolios:

1. identify skilled practitioners;
2. show the practitioners the problem for which you are seeking support;
3. the practitioners recount similar problems they have solved; and
4. decide what the stories teach (p. 71).

Jonassen and Herandez-Serrano (2002) believe that “stories elicited from skilled problem solvers, indexed for the lessons they have to teach, and made available in the form of case libraries can support a broader range of problem solving than any other strategy or tactic” (p. 65).

It is quite appropriate to begin with just a few cases and build the library from that base (Leake, 1996). Hernandez-Serrano and Jonassen (2003) used 24 cases in their study described earlier concerning the Nestlé Refrigerated Food Company scenario. The size of the library is only one of three criteria that Smyth and McKenna (1998) apply to measure the effectiveness of a case library. Smyth and McKenna (1998) agree that the size of the library does have some bearing on its usefulness, but large libraries may contain cases that refer to rare events or are redundant. The density and distribution of cases are other factors in the usefulness of a library. A lot of cases centred on the one issue is likely to result in the learner finding a case similar to the problem they are encountering. However, individual cases become less significant in a dense area of the library, or conversely if a learner has only a few cases to work with then each case becomes important. Again, libraries with areas of high density are more likely to contain redundant cases.

After cases are collected to build a case library, an instructional designer needs to consider the most appropriate format for the cases and how learners will access the cases. Format options include PDF, video, audio, and paper files, while access options include online project rooms, web sites, DVD, and printed booklets. The next consideration is how the learner interacts with the case library in a process called case-based reasoning.

2.10.4 Case-Based Reasoning

Case-based reasoning evolved from the fields of cognitive science and artificial intelligence and the work on developing systems that would enable machines to carry out human functions, including reasoning and learning (Leake, 1996). Early attempts at "expert system building [had] concentrated on the knowledge that underlies human expertise and given less emphasis to the significance of domain-independent problem solving heuristics" (Glasser & Chi, 1988, p. xvi). That is, access to extensive and sophisticated knowledge does not mean a system is able to replicate the complexities of human problem solving.

Kolodner and Leake (1996) are two of the early authors in the field and they provide this summary of case-based reasoning:

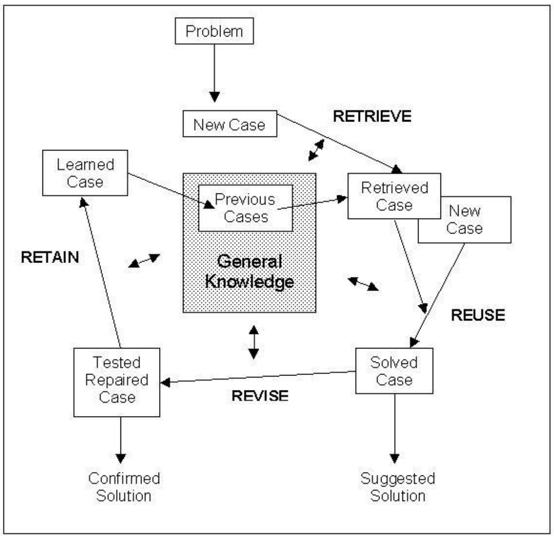
> Case-based reasoning means reasoning based on previous cases or experiences. A case-based reasoner uses remembered cases to suggest a means of solving a new problem, to suggest how to adapt a solution that doesn't quite work, to warn of possible failures, to interpret a new situation, to critique a solution in progress, or to focus attention on some part of a situation or problem. (p. 31)

The cyclic nature of case-based reasoning makes it suited to influencing beliefs about teaching with technology. That is, learning is viewed as an on-going process and it adapts well to the problem of evolving technologies and the changing needs of teachers. Jonassen and Hernandez-Serrano (2002) describe this cyclic nature of case-based reasoning:

> An encountered problem (the new case) prompts the reasoner to retrieve cases from memory, to reuse the old case (i.e., interpret the new in terms of the old), which suggests a solution. If the suggested solution will not work, then the old and or new cases are revised. When the effectiveness is confirmed, then the learned case is retained for later use. (p. 70)

Aamodt and Plaza (1994) further illustrate the process in Figure 2.2.

Figure 2.2: The Case-Based Reasoning Cycle



(Aamodt & Plaza, 1994, p. 46)

Leake (1996) says “humans are robust problem solvers; they routinely solve hard problems despite limited and uncertain knowledge, and their performance improves with experience” (p. 5). The quality of the human problem solving capacity has been difficult to replicate in machines. The four steps in the cycle of r*etrieve*, *reuse*, *revise*, and *retain* resembles the natural process in human problem solving, and is a process that scientists have been able to adapt for machines. The role of the case library discussed earlier is to provide a store of cases for the retrieve step, and as a repository for the new learned cases. The quality of cases improves over time because they are continually being retrieved, applied, and repaired.

Kolodner (1993) believes that case-based reasoning is similar to our everyday reasoning that we might otherwise label *common sense*. For example, we are faced with a new problem of what to cook for dinner. We consider the meals that we have cooked previously, our knowledge about meals that we may have read in a recipe book or watched on television, the context of who will be eating the meal and where, and the available ingredients. As a result of processing this information we proceed to cooking the meal. We taste the food, make adjustments, and are either happy with the outcome and serve the meal or consign it to the bin. This new meal will be remembered for another occasion with similar circumstances. As Kolodner (1993) says “the second tine we solve some problem or do some task is easier than the first because we remember and repeat the previous solution” (p. 5). Leake (1996) adds that the types of problems that people face tend to reoccur. Therefore “small changes in the world require only small changes in the way we interpret the world and small changes in solutions” (Kolodner, 1996, p. 359).

One of the principles associated with case-based reasoning is *reminding*. In our everyday lives one thing will remind us of another, whether it is an event or a physical object. For example, a song might remind us of a person, an object might remind us of a building, or a phrase in a sentence might remind us of something we had to do (Schank, 1988). Similarly, when teachers encounter a problem they will be reminded of similar cases that involve that problem. As illustrated in Figure 2.2, the cases they are reminded of may be in stored knowledge, e.g., in a case library, a video, or a book, or the case they are reminded of may have originated from the teachers’ own lived experience, e.g., a previous class. The case or cases the teachers are reminded of are a starting point to solve the problem.

Expert practitioners will be reminded of a greater number of cases and breadth of cases than novices (Schank, 1988). For example, expert chess players will have played more games than novice chess players and will have seen more patterns or cases of play. They will have played other experts at a higher level of sophistication than novices, conversed with experts about strategy, and perhaps read books to build their experience.

Kolodner and Leake (1996) explain that a key concept in case-based reasoning is that knowledge is stored in our memory as cases that reflect prior episodes in our lives. A case, unlike knowledge that is stored as a generalized rule, carries with it a range of information, e.g., the context and the people involved. This additional information provides the problem solver with clues as to when the retrieved case is applicable.

2.10.4.1 Case-based Reasoning in Education

Despite an extensive impact in the fields of commerce, defence, medicine, law, and others, there appears to be little transference of case-based reasoning to applications in the professional learning of educators (Kolodner & Leake, 1996; Aamodt & Plaza, 1994; Kolodner, 1993). However, Kolodner and Leake (1996) provide reasons as to why case-based reasoning is well suited to educational contexts such as the *ePortfolio Project*. First, participants will save time because it provides solutions to problems that others in a similar situation have encountered. This allows the participants to move on to the more complex problems they are likely to encounter in the advanced stages in the implementation process. Second, the classroom implementation of ePortfolios is still a relatively new topic with limited information that has been tested in the field. Case-based reasoning generates unique solutions to unique problems and is also a way of recording those unique solutions so that others will benefit. Third, case-based reasoning provides participants with a strategy to evaluate their progress, when there are no other methods available. Fourth, the cases warn the participants of potential problems and to avoid those problems before they arise. Fifth, cases of implementation reflect the most crucial problems which help participants to focus on the important part of the problem.

As previously discussed in the Nestlé Refrigerated Food Company scenario developed by Hernandez-Serrano and Jonassen (2003), the use of cases to support learning is particularly suited to participants who are already experts in their field. Teachers viewing cases of other teachers implementing ePortfolios will immediately recognize many elements of the case as being similar to or different from their own situation. Just as the expert technicians did in the Orr (1996) study, they need very little information to identify and understand the implications of the messages in the cases. Teachers are adept at sharing their stories as cases, and applying what they have learned in one experience to a new experience. Novices have difficulty making these connections and solving problems in this way because they rely on rules (Hernandez-Serrano & Jonassen, 2003). The development of artificial intelligence has demonstrated that rules are too specific and do not apply in every situation. Novices do not have the experience in the form of cases to know which rule to apply and when, and how to adjust a rule to suit a situation (Glasser & Chi, 1988). Experts are not reliant on rules, but rather as Riesbeck and Schank (1989) say "they are libraries of experience" (p. 15).

Karni and Kaner (2002) provide the following summary of the benefits of case-based reasoning:

1. A case base becomes useful with the first case;
2. A case base captures knowledge easily;
3. Case bases are understandable (logical and easy to follow);
4. Case-based reasoning augments human capabilities;
5. [Learners] view previous situations and decisions rather than face a set of prescribed rules or models;
6. Provides a highly flexible format for storing . . . variegated knowledge;
7. Knowledge is not preprocessed;
8. The case format is flexible and may be modified over time without impacting the methodology; and
9. Organizational learning is similar to the [case-based reasoning cycle] and so can be supported by [case-based reasoning] technology (p. 26).

As with other concepts applied in the *ePortfolio Project*, it is intended that case-based reasoning will be explained to participants so they are aware of the processes involved in their own learning.

2.11 Information Resources

The third element of a constructivist learning environment is called *information resources* (see Table 2.1). Information resources, along with related cases, are components of the stored knowledge section of Figure 2.1. These two components are accessed by participants while they are learning and also provide a record of what the project has achieved. That is, others who are interested in the classroom implementation of ePortfolios have a starting point from which to proceed. Learners access information resources during problem solving "to construct their mental models and formulate hypotheses" (Jonassen, 1999, p. 225). Jonassen (1999) warns that learners may not have the skills to evaluate sources of information and the information provided by open sources such as web links might be distracting in its quantity and confusing in its relevance. This reinforces the need to understand the learner, the context, and the issue in order to make the following decisions:

1. What are the key information resources that learners will need?
2. Who will collect and assemble the information, e.g., the instructional designer, facilitators, or learners?
3. How are the information resources to be formatted?
4. How are the information resources to be accessed? and
5. How are the information resources to be used?

The information resources need to provide "learner selectable information just-in-time" (Jonassen, 1999, p. 225). For example, participants will be solving problems associated with ePortfolio implementation at workshops, during classroom lessons, before and after school, and at home. Participants need to access the information relating to that problem at that time. Information required in resolving a problem during class time will need to be well indexed and in summary form because time will be an issue. On the other hand, participants may find it a rewarding experience to undertake their own research at home to address a particular problem.

2.12 Tools

The fourth element of a constructivist learning environment is called *tools* (see Table 2.1). Jonassen (1999) lists three types of tools. First, cognitive or knowledge-construction tools support the performance of learners in addressing the complex tasks associated with ill-structured problems. These tools help the learner to "visualize (represent), organize, automate or supplant thinking skills" (p. 226). They either replace the thinking that is required of the learner, or else initiate thinking that would not have otherwise occurred. The second type of tools is the static and dynamic knowledge modelling tools which support the performance of learners and assist them to gather and present information. Static knowledge modelling tools include "databases, spreadsheets, semantic networks, expert systems, and hypermedia construction" (p. 227). Learners use these tools to support their thinking about what they already know and the meaning of new information. For example, when learners enter information into a database or construct a semantic network, the process requires them to think about the relationship between the elements. Dynamic knowledge modelling tools are used to build simulations of complex real-world phenomena. Learners are able to study causes and effects by manipulating variables and predicting and observing changes in outcomes. Jonassen et al. (1995) describe micro-world simulation as "enter[ing] into intellectual partnership with technology" (p. 20). Both the static and dynamic tools automate complex and repetitive algorithmic tasks allowing the learner to focus on the problem at hand.

The third type of tool supports conversation and collaboration. Collaborative learning occurs in learning situations when learners work together to understand subject matter (Bruffee, 1999). There are factors to be considered in developing a collaborative community of learners:

1. purposeful design motivated by a clear pedagogical perspective that reflects users' needs and interests;
2. involvement of a leadership group;
3. facilitating a common understanding between users; and
4. negotiation of common understandings (DiMauro & Jacobs, 1995, pp. 128-129).

McLellan (1996) points out that learners who "articulate their knowledge, reasoning, or problem-solving processes . . . come to a better understanding of their thinking processes, and they are better able to explain things to themselves and to others" (p. 12). During the process of articulation, learners break down or separate out component skills so they can better understand them. Collaboration is also a very important element of learning from the constructivist perspective because it is central to negotiating meaning (Jonassen, 1994). Jonassen and Land (2000) describe meaning making as "resolving the dissonance between what we know for sure and what we perceive or what we believe that others know" (p. vi). Learners develop understanding through their learning but each learner will interpret the same content and concepts differently (Jonassen et al., 1991). By evaluating that understanding during conversations with other learners they will come to common understandings and modify their existing knowledge structures and build new knowledge structures (Jonassen et al., 1995). Besides negotiating meaning, conversation in the social context also has a role in the planning that occurs in solving problems by "reflecting on what is known, what needs to be known, the viability of various plans, and their potential effectiveness" (Jonassen et al., 1995, p. 14). Furthermore, from the constructivist perspective, knowledge is not an entity but rather "exists in individual and socially negotiating minds . . . discourse among individuals, the social relations that bind them, the physical artefacts that they use and produce, the theories, models and methods they use to produce them" (Jonassen & Land, 2000, p. vi). Therefore, an investigation of learning needs to consider the social context in which that learning occurs (Jonassen & Land, 2000).

However, Guzdial and Turns (2000) warn that simply establishing a discussion forum will not guarantee it will be an effective learning tool. For example, learners may:

1. not choose to participate;
2. fail to initiate discussions with questions or issues, to respond to notes written by others, or to even read what others have written; and
3. talk about topics unrelated to [learning] goals or only engage briefly in discussions (p. 438-439).

To counter these issues, Guzdial and Turns (2000) propose three goals for instructional designers to improve the effectiveness of discussion forums. First, discussion forums should be sustained. Besides increasing participant confidence in each other as effective learners and problem solvers, time allows notes in threaded discussions to build in both quantity and capacity to explore questions and develop multiple perspectives, a criterion of cognitive flexibility. Second, discussion forums should include broad participation. This requires learners to not only read what is written in discussion forums, but to also contribute. Similar to the previous arguments about activity, effective collaboration demands active participation by learners. Third, discussion forums should focus on relevant topics. That is, instructional designers need to be concerned with what learners are discussing, besides how much discussion is taking place and for how long.

As pointed out in chapter one in the discussion about quality professional development, collaboration needs to be both synchronous to support planning and brainstorming and asynchronous to report on experiences and reflections (Guzdial et al., 1996). A web site sponsored by Education Queensland called *The Learning Place* is accessible for the *ePortfolio Project* and is able to cater for both forms of collaboration. Once accessibility has been decided, another consideration is the role of the facilitator. Leading collaboration promotes a view amongst learners that the teacher is a facilitator, a coach, or a mentor, rather than someone who conveys facts (Jonassen, 1994). Watson and Prestridge (2003) warn that while the presence of the facilitator in a discussion forum can serve to initiate discussion, particularly in the early stages, it can also be problematic and stifle discussion. As with other aspects of the *ePortfolio Project*, participants need to be confident that they can present their work as a case and contribute to discussions without ridicule and that their contribution will be valued and taken seriously. For example, it is important that the facilitator should not encourage competition amongst learners for attention or recognition (Jonassen, 1994).

2.12.1 Cognitive Apprenticeship

Cognitive apprenticeship is a concept that encompasses the discussion earlier on authenticity of the learning environment (see section 2.9), the community of practice (see section 2.7), and collaborative learning discussed above. Again, exploring the concept of cognitive apprenticeship requires the abandonment of the notion that knowledge is a self-contained entity. Instead, Brown et al. (1989) ask that we consider knowledge as a tool. Similar to a tool, knowledge has to be used before it can be fully understood, which aligns with the discussion about the need for learners to be actively involved during learning. But as well, using knowledge, like a tool, involves the user changing their view of the world and “adopting the belief system of the culture in which they are used” (p. 33). That is, the term *apprenticeship* is used in the literal interpretation such as we associate with a master tradesperson and an apprentice learning their trade. The apprentice becomes immersed in the world of the master, learning a new language, learning the culture that is built up around the trade, and learning a new way of doing things. Taking the analogy even further, an apprentice may acquire tools or knowledge, but will not be able to use those tools or that knowledge unless they are actively engaged in activity in which the knowledge and tools are used to construct something, i.e., solving problems related to a real world issue. “People who use tools actively rather than just acquire them . . . build an increasingly rich implicit understanding of the world in which they use the tools and of the tools themselves (Brown et al., 1989, p. 33).

Brown et al. (1989) further explain through the concept of cognitive apprenticeship why the learning of rules is only one part of learning, as revealed in the previous discussion about case-based reasoning and the definition of an expert as a library of cases. For example, a carpenter uses a chisel in the way that reflects “the accumulated insights” (p. 33) of the community of carpenters, and to understand the way a carpenter uses a chisel it is necessary to understand that community. The same process applies for applications of knowledge or conceptual tools, because they are derived from negotiations within a community that are built around social collaboration. That is, carpenters build an understanding of using tools in the way they do because they collaborate with other carpenters.

Through an understanding of knowledge as a tool and cognitive apprenticeship, Brown et al. (1989) offer fours insights into the role of collaboration in learning that are useful for instructional designers in developing strategies. First, a community of practitioners working collaboratively is able to solve problems by collectively providing insight beyond the capacity of an individual working alone. Second, an individual undertaking a task has to assume all of the roles involved in that task, whereas individuals in a group may each take a role and reflect on that role and how well they performed in that role. Third, as discussed previously, learners develop misconceptions or wrong analogies. Teachers on their own are not able to communicate sufficiently with learners to determine if these misconceptions are occurring. However, Brown et al. (1989) believe “groups can be efficient in drawing out, confronting and discussing both misconceptions and ineffective strategies” (p. 40). Fourth, learners who are taught as individuals do not develop the skills of learning and solving problems as a group. That is, if collaboration is considered to be a key aspect of learning then learners need to be actively involved in collaborative situations. McLellan (1996) adds that these four roles of collaboration in learning represent important skills for learners in the modern workplace. Feltovich et al. (1996) take the importance of internalising these skills one step further in describing the related concept of internal collaboration. That is, individuals should develop in their own minds similar processes to that of group collaboration. They can achieve this higher level of reflection by cultivating different ways of thinking and taking into consideration different interpretations, rather than accepting singular and “restricted representation of domains and the postulation of more order than most knowledge domains actually possess” (p. 28).

2.13 Social and Contextual Support

The fifth element of a constructivist learning environment is called *social and contextual support* (see Table 2.1), which is concerned with the implementation of the project. Instructional designers need to consider the “physical, organizational, and cultural aspects of the environment in which the innovation [is] being implemented” (Jonassen, 1999, p. 230). The researcher’s experience as a principal will be an important factor in attending to social and contextual support, as he is familiar with the context and his everyday work for the past 30 years has been to support teachers in what they do. Nevertheless, facilitating a project across an education region is a demanding task. The researcher was trained as a facilitator for the Education Queensland ICT Pedagogy Licence and learned new strategies in leading professional development projects. For example, it is important that facilitators greet participants as they arrive for workshops and personally farewell them as they leave. The researcher would be able to apply his experience in advising facilitators who conduct sessions during the *ePortfolio Project* on support strategies (Jonassen, 1999).

One of the issues emphasized in the literature review is the need for learners to feel comfortable in a new approach to professional development that may be outside their previous learning experiences. For example, earlier discussions described five aspects of a supportive social environment that can be created to promote metacognition as proposed by Lin (2001) that included creating a metacognitive culture, using a systems approach, everyone taking on a role, and supporting discourse within the community of practitioners. Of importance is the participants’ knowledge about the self-as-learner. Lin (2001) suggests that such knowledge will be derived from the roles that participants take on during the project and that those roles are situational and influenced by the people they are with at the time. One of the attributes of the *ePortfolio Project* is that everyone will be perceived as a learner, because local experts simply do not exist. While some participants will consider themselves to be competent in using the technology to create ePortfolios, anyone who has reached that level of competency will be aware that whatever they know only serves to remind them of how much more they could know. That is, learning about technology is a continual process if for no other reason than the continual evolution of the technology itself. On the other hand, there will be opportunities for the participants to take on the role of teacher as they present their work as cases and assist by facilitating sessions. The challenge for the researcher and other project facilitators is to develop participant knowledge about the self-as-learner, as well as supporting learners to identify their personal learning goals and "to pursue their personal interests in meaningful ways" (Lin, 2001, p. 37).

2.14 Goals in the Experienced Cognition Framework

This concludes the needs and task analysis as discussed in section 2.3.1. At this point in a traditional objectivist project, the instructional designer would specify the goals of the instruction. That is, if the purpose of the project is to transmit knowledge, then it is assumed that learners will adopt the same goals as the instructor (Choi & Jonassen, 2000). The experienced cognition framework initially described by Carlson (1997) is aligned with the situative perspective, and takes a different view on the role of goals.

As explained by Choi and Jonassen (2000), the experienced cognition framework is based on cycles of perception and action. In simple terms, the environment is experienced and perceived, and reflection is triggered if what is perceived is different from what had previously been perceived. This is called a *belief failure*. In the learner's mind are both the previous perceptions and the new perceptions, and it is through reflection that a decision is made as to what action to take. Unlike the traditional objectivist approach, perception is not a passive receptive process. Learners are continually changing goals and plans according to what they perceive in order to solve the particular problems arising from those perceptions. Choi and Jonassen (2000) summarize the implications of experienced cognition for learning:

1. Learners have ownership in their learning;
2. Learning goals are established by learners through the process of co-considering learning self and learned objects or environments in which learning occurs;
3. Learner goals determine how learners will see problems and approach them;
4. Belief failures are opportunities to learn; and
5. Prespecified learning objectives prevent learners from meaningful learning, rather than guiding the learning process (pp. 38-39).

These implications for learning have further implications for the instructional design of the *ePortfolio Project* (Choi & Jonassen, 2000). The goals of the learners and the school culture where most of the learning takes place will need to be understood and analysed, including the learners' motivation and their issues and problems. The process of analysis was initiated in the literature review, but it is also an on-going process throughout the field work associated with the project. Furthermore, the learning environment should present the learners with perceptions that contradict what they have previously known and done in order to cause belief failures. It is the reflections that are generated through these contradictions and belief failures that will lead to new actions, a point that is consistent with arguments in section 1.4.4. If learners are constantly considering new goals and reshaping their plans, then it is inappropriate and perhaps counter productive for the instructional designer to outline objectives that are overly specific. Providing general goals will allow learners the flexibility to define their own goals during the process of learning.

In consideration of the experienced cognition framework, the goals of the *ePortfolio Project* are as follows:

1. To promote the classroom implementation of ePortfolios in Queensland state schools;
2. To convey to project participants an understanding of the concept of ePortfolios;
3. To provide cases of the classroom implementation of ePortfolios;
4. To support project participants in developing technology skills;
5. To provide information about the potential of ePortfolios to improve student outcomes;
6. To provide information and ideas about approaches to implementing ePortfolios;

7. To support participants as they implement ePortfolios in their classrooms and schools; and
8. To encourage participants to share their work on ePortfolios.

2.15 Similar Projects

The *ePortfolio Project* is a unique investigation because it involves the development and refinement of the Professional Development Framework (see appendix B) that was assembled by the researcher from various theories identified in the literature review. However, other studies have investigated specific elements of the project.

Skaalid (2007) created a constructivist learning environment for a Social Studies project in a Grade 8 classroom. This study is relevant because teachers in the *ePortfolio Project* will be asked to create constructivist learning environments as they implement ePortfolios, i.e., to teach as they are taught. Students in the Social Studies project researched information, and wrote, acted in and recorded short plays about events in the history of Canada. Some of the constructivist oriented strategies included construction and reorganisation of knowledge, the use of tools, collaborative group work, and presenting multiple perspectives. Negative aspects of the project included the amount of time needed for the activities and problems with the technology. On the other hand, teachers and students had positive attitudes, students perceived the activity as fun, and non-traditional students experienced success because of the alternative mode of learning. The researcher, though, commented on the amount of work involved in research of this nature.

Heath and Ravitz (2001) conducted a study in six schools with 25 teachers to investigate what constructivist learning environments supported by technology look like in practice. They concluded that no single model of constructivist learning environments emerged, but each shared common characteristics. Students appeared to be more active, autonomous, and engaged compared with baseline data. They were more willing to work collaboratively and to use technology to solve problems. The curriculum was more flexible and the teacher took the role of producer rather than director, i.e., establishing the learning situation and supporting the students in finding means to arrive at solutions.

Taylor, Fraser, and Fisher (1997) undertook a trial of a new version of the constructivist learning environment survey that has five scales. The scales further define and reinforce the key elements of a constructivist learning environment that have been discussed in the literature review:

1. Personal Relevance Scale - connectedness of school science to students' out-of-school experiences; use of students' everyday experiences as a meaningful context for the development of students' scientific and mathematical knowledge;
2. Uncertainty Scale - opportunities are provided for students to experience scientific knowledge as arising from theory-dependent inquiry involving human experience and values, and as evolving, non-foundational, and culturally and socially determined;
3. Critical Voice Scale - students feel that it is legitimate and beneficial to question the teacher's pedagogical plans and methods, and to express concerns about any impediments to their learning;
4. Shared Control Scale - students being invited to share with the teacher control of the learning environment, including the articulation of learning goals, the design and management of learning activities, and the determination and application of assessment criteria; and
5. Student Negotiation Scale - opportunities exist for students to explain and justify to other students their newly developing ideas, to listen attentively and reflect on the viability of other students' ideas and, subsequently, to reflect self-critically on the viability of their own ideas (p. 296).

The study by Welch (1997) has many similar goals to the *ePortfolio Project*, and adds confidence that the strategies discussed in the literature review will meet with success in the field. Welch (1997) was interested in the professional development of educators, namely school principals, and was concerned to know whether or not the application of constructivist principles would influence learning outcomes and in particular change practices. She concluded that constructivist principles can successfully guide the design of learning for educators, and highlighted the importance of goals being developed by the learner within the larger conceptual framework, and the role of the social environment in supporting and challenging learners.

Atkinson (2005) compared five dimensions of communities of practice with nine factors of technology integration in a qualitative study involving 218 teachers. She concluded that technology integration increased peer interactions within a community of practice and that the technology support for teachers was enhanced by their involvement in a community of practice. Kline (2007) investigated the evolving of communities of practice in projects where teachers consider their teaching practices. She concluded that communities of practice are most effective when teachers are involved on a voluntary basis with a shared sense of purpose. Furthermore, teacher leadership is both a prerequisite and outcome of communities of practice.

2.16 Summary

Two complementary arguments repeated throughout the literature review originated in Schön's (1983) critique of professional expertise. Eraut (1994) explains that the first of these arguments is based on the belief "there are severe limitations to what can be achieved by a purely positivist approach in the complexities of the real world" (p. 142). Chapter one highlights the complex nature of professional development for technology integration because the nature of teaching involves ill-structured problems and the goals of the professional development involves challenging teachers' beliefs. The second argument is that "the technical rationality model fails to take proper account of how professionals work in practice in order to achieve their desired goals" (Eraut, 1994, p. 142). Discussions have led to conclusions that expert practitioners learn and solve problems in different ways to novices, and highlight the potential role of cases in a new approach to professional development.

An old idea that has developed momentum in educational applications is the constructivist perspective. The instructional design of professional development projects based on this perspective focuses on creating a learning environment that provides a flexible shell and includes strategies and content that are available to the learner at the moment of learning and not decided before hand (Winn, 1991). Honebein (1995) summarizes the seven pedagogical goals of constructivist learning environments discussed in the literature review:

1. provide experience with the knowledge construction process (activities . . . provide learners [with] a level of autonomy in the learning process);
2. provide experience in and appreciation for multiple perspectives (learners can examine other learners' problem solving processes);
3. embed learning in realistic and relevant contexts;
4. encourage ownership and voice in the learning process (learner-centered rather than teacher-centered);
5. embed learning in social experience (collaboration);
6. encourage the use of multiple modes of representation (different media represent knowledge in different ways); and
7. encourage self-awareness of the knowledge construction process (pp. 12-22).

However, a list of principles is not a useful approach for an instructional designer, particularly in attempting to replicate processes in previous and future projects. On the other hand, the constructivist learning environment proposed by Jonassen (1999) is a step by step process that assures an instructional designer that all of the principles from the constructivist perspective are attended to. The literature review was organised around the five elements of an adaptation of Jonassen's (1999) constructivist learning environment (see Table 2.1), and outlines associated strategies and warns of potential pitfalls.

While a constructivist learning environment appears to meet the needs of the *ePortfolio Project*, there is nothing inherent within the design that will generate the information required to respond to the important research questions raised in chapter one. What is needed is a framework that will assist the researcher as instructional designer to design, develop, and implement a constructivist learning environment that addresses the five elements and each of the strategies within those five elements. Furthermore, the framework will need to ask questions about the appropriateness and effectiveness of this approach in the *ePortfolio Project* and other projects, as well as the benefits for the organisation. Such a framework is the topic of chapter three.

Chapter 3: Research Questions and Methods

Barriers to teaching with technology, including the classroom implementation of ePortfolio frameworks as an application of technology, "include beliefs about teaching, beliefs about computers, established classroom practices, and unwillingness to change" (Ertmer, 1999, p. 48). The purpose of this study is to investigate the potential of a constructivist learning environment to support teachers and school administrators in their learning about ePortfolios so they may take on new beliefs and adopt new practices. A constructivist learning environment draws together available resources and guides activities to support learning in a way that will engage the learner, with learners themselves having a central role in assuming responsibility for their learning.

The self-motivation of learners is particularly relevant to this study because the classroom implementation of ePortfolios is not mandated in the Queensland school curriculum. Sustained involvement by teachers and school administrators in learning about ePortfolios depends on their recognition of a need to be innovative with the new technologies and their willingness to change their beliefs and practices. That is, the motivation for these learners is their valuing of ePortfolios as a desirable activity with a positive effect on children's learning. This is consistent with conclusions in a previous study by the researcher (Otto, 2003) in that the perceived needs of children were identified as a source of information that influenced principals' beliefs about teaching with ICTs (see appendix A).

A learning environment "is first and foremost a system that consists of interrelated components that jointly affect learning in interaction with (but separately from) relevant individual and cultural differences" (Salomon, 1996, p. 365). Recognition of the learning environment as a system is an important distinction that affects the evaluation of both discrete activities and the system as a whole. In the evaluation of discrete activities, Jonassen and Rohrer-Murphy (1999) argue:

> Activity cannot be understood or analysed outside the context in which it occurs. Therefore when analysing the human activity within the project, we must examine not only the kinds of activities that people engage in but also who is engaging in that activity, what their goals and intentions are, what objects or products result from the activity, and the rules and norms that circumscribe that activity and the larger community in which the activity occurs (p. 62).

According to Greeno (1997), the focus of the evaluation of the system as a whole should be on "the contribution of learning activities to the learners' development of greater efficacy in their participation in valued social practices and to the development of their identities as capable and responsible learners" (p. 9).

These two statements are indicative of the depth and breadth required of a framework appropriate for the evaluation of a constructivist learning environment, and the importance of understanding the role of context. The evaluation of a learning environment as a system in a context will make an important contribution to the body of research in this field as explained by Salomon (1996):

> Although each of the factors that seem to constitute a learning environment has already been studied to one extent or another as an independent entity, the relations among the components - the way they configure jointly - have rarely, if at all, been studied (pp. 367-368).

3.1 Research Questions

Based on consideration of the literature and the objectives of the study, the following research questions have been identified:

1. What framework can be developed to guide the design and implementation of a constructivist learning environment to support the professional development of teachers and school administrators about ePortfolios?

2. How effective is a constructivist learning environment in supporting the professional development of teachers and school administrators about ePortfolios? and
3. Can the framework be applied in other projects to guide the design and implementation of a constructivist learning environment to support professional development?

To investigate research questions one and two, a professional development project was initiated to support teachers and school administrators in the classroom implementation of ePortfolios. Project activities were guided by the principles of a constructivist learning environments proposed by Jonassen (1999), and are reported in appendixes C-F. Funding was procured through the Education Queensland Strategic Curriculum Support initiative and the Australian Government Quality Teachers Programme to support a network of professional educators interested in learning about ePortfolios. A planning committee responded to the needs of the network and organised workshop sessions to share stories about the implementation of ePortfolio frameworks, to develop the technology skills of teachers, and to fund the release of teachers to develop and share ePortfolio frameworks as cases. Collaboration and access to information resources were facilitated by the Education Queensland sponsored website *The Learning Place*. To further investigate research question two, the researcher supported the facilitator of an *ICTs in Mathematics Project* in developing a constructivist learning environment as the instructional design for the project. To investigate research question three, the Professional Development Framework (see appendix B) that emerged from the *ePortfolio Project* was applied in a *Success for Boys Project.*

3.2 Research Plan for the Study

There is a growing need to evaluate learning environments enhanced by advances in technology and its proliferation. For example, universities need to evaluate the cost effectiveness and benefits to students of multi-media programs designed to support courses. Software engineers need to assess the usability and profit potential of their products, and government-funded projects require reports to justify expenditure (Bober, 2001). The literature provides many examples of these evaluations of varying types and quality. For example, Alexander & McKenzie (1998) evaluated 104 projects that received funding from the Committee for the Advancement of University Teaching (CAUT).

Bain (1999) believes that evaluations of innovations in higher education were giving insufficient attention to learning processes and learning outcomes. Alexander (1999) supports this view, and in the evaluation of the CAUT funded projects reports that "many project evaluations did not involve the collection of meaningful evidence of student learning outcomes" (p. 178). Specifically, she observed "heavy reliance on student reaction surveys, and in some cases there is an apparent confusion between student reactions and student learning" (p. 181). Alexander (1999) recommended that projects should be designed around a learning framework such as the constructivist learning environment proposed in this study, and should have a greater emphasis on formative evaluation in the design phase. In recognition of this need to evaluate innovative learning environments enhanced by technology, Bain (1999) invited article contributions to a special edition of the Higher Education Research and Development (HERDSA) journal. Bain (1999) selected five articles from the 16 submitted, but determined that "no single article employs the full range of evaluation criteria, but collectively they illustrate most aspects that should be considered" (p. 166). It is this integrated approach called the Learning Centred Evaluation Framework (LCEF) (Phillips, 2001) as adapted in appendix B that forms the evaluation framework for this project. The LCEF has four characteristics (Phillips, 2001):

1. It presumes that evaluation will occur in each of the major phases of an educational development project (design, development, implementation, and institutionalisation);
2. It focuses attention on three aspects of learning:
    a. the learning environment (where people learn, or the ICT innovation);
    b. the learning process (how people learn); and
    c. the learning outcome (what people learn);

3. It encourages evaluators to frame appropriate and answerable evaluation questions; and
4. It outlines the types of evidence and methods that may be appropriate for each question (p. 4).

The LCEF accommodates the three research questions and the developmental nature of the project. The investigation of research question one requires the design, development, and implementation of a constructivist learning environment to support teachers and school administrators in their professional learning about ePortfolios. The investigation of research question two draws on the information generated during the implementation phase of the project, as well as information relating to the institutionalisation of the project. Research question three verifies the appropriateness and flexibility of the evaluation design framework in being applied to other professional development topics. The LCEF meets the criteria recommended by Alexander (1999) in that evaluation is an integral part of all stages of the project. Furthermore, there is flexibility within the LCEF to add a range of data collection techniques, and it can be integrated with activity theory to provide a structured and established tool for data analysis (see section 3.5).

3.2.1 Similar Studies using the Learning Centred Evaluation Framework (LCEF)

The LCEF was applied in 20 multi-media projects funded by the Australian Government Committee for University Teaching and Staff Development (Phillips, 2001). These projects were designed to support student learning, and were developed and implemented in universities across Australia. The application of the LCEF addressed shortcomings in the evaluations of other projects as identified by Alexander and McKenzie (1998), and the report provides exemplars of learning projects enhanced by technology.

The first of these projects to be reviewed is one mentored by Bain himself, which also relates to the concept of ePortfolios. The title of the project is *Evaluating the use of online course portfolios for assessment and learning in the graduate certificate in flexible learning* (Phillips, 2001). The aim was for students to have a more active role in assessment processes through their selection of materials to include in their portfolio, and for students to apply higher levels of cognitive skills in analysing their own work. The portfolio, in electronic format and online, was to draw together learning experiences and collaboration was encouraged between distant learners and between teachers and learners. Dimensions of the evaluation included the value of portfolios: as an assessment tool; as a tool for documenting and demonstrating learning; as a tool to facilitate a collaborative reflective learning process; and as a way of experiencing incorporation of technology. Other features of the project were that learning processes were made visible to learners, evaluation strategies were embedded in learning experiences, and data were collected as part of experiences associated with learning. The report relates how the LCEF was integrated with and guided the project through the four phases described above. Of particular interest was the establishment of a management team to oversee the project, a strategy that was applied in this study of teachers and school administrators. Also of interest was the elaboration of institutionalisation, namely to determine the “sustainability of the innovation in [its] context, and the robustness of the learning and its transfer beyond the immediate context of the innovation” (Phillips, 2001, p. 62). The questions Phillips (2001) propose were applied in the data analysis for this project (see section 3.5).

The second project to be reviewed is a distance education learning environment for post-graduate students designed to integrate computer conferencing into course units (Phillips, 2001). The project reports the influence of computer conferencing on student learning, and of particular interest is the approach to summative evaluation. Table 3.1 provides an example of the information sources that may inform this study of ePortfolio implementation, including observation, the frequency of messages, and focus groups.

Table 3.1: Evaluation Model

LCEF		Research Questions	Methods
1. Summative evaluation of learning process	a.	How is computer conferencing used in teaching and learning for sharing ideas and constructing knowledge?	Voluntary focus groups Online observation Assessment analysis Message frequency
	b.	How is conferencing interaction used by the students in the unit?	
	c.	How have students responded to the differing requirements to communicate online?	
2. Summative evaluation of learning outcome	a.	How have students perceived the effect of online interaction on their learning?	Voluntary focus groups Summative online discussion
3. Summative evaluation of innovation appropriateness	a.	In what ways have the lecturers in the project's units structured their unit activities and assessment to use the computer conferences?	Online observation - retrospective analysis Future planning

(Phillips, 2001, p. 204)

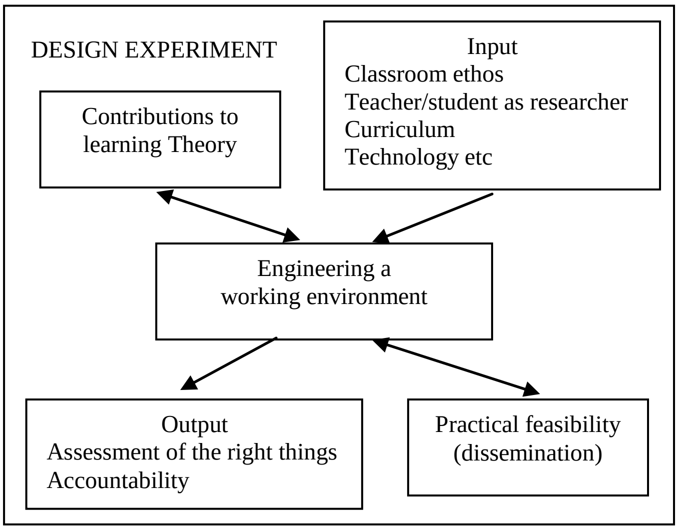
Because evaluation is an integral part of every phase of these projects from the design of activities to the reporting of outcomes, the concept of *construction* applies consistently to both the project as a whole and what happens to learners. The benefit to be gained from this approach in a study of the learning of teachers and school administrators is that the instructional design for their learning activities is consistent with the instructional design they are encouraged to apply in designing learning activities for children. To maximise the benefit of this approach, the teachers and school administrators need to be made aware of the principles of constructivist learning environments that are driving the design of their learning about ePortfolios, and they need to establish a link between their own learning and the learning of children. That is, the principles of constructivist learning environments as an instructional design need to be explicit, explanations need to be provided as to how those principles are guiding activities, and examples need to be presented as to how the same principles can be applied to activities in the classroom.

As argued previously, the implementation of ePortfolios as the focus for the learning activities in this study also lends itself to a focus on constructivist oriented learning, as well as taking a central role in the construction of classroom activity. Furthermore, it is anticipated that the technology skills that teachers and school administrators develop in learning about ePortfolios, and that children develop in creating ePortfolios, will also apply across other learning activities in which they are involved. For example, a teacher is shown how to use Photo Story 3 to organise images into a presentation, and practises on holiday snaps before introducing the program to the classroom. The teacher then encourages a child to use a digital camera to take photos of their project, to download the photos to a directory in a computer, and to create a presentation with Photo Story 3 that includes text, commentary, and background music. The child adds the presentation to their ePortfolio. When activities similar to these become an accepted part of what happens both in and out of classrooms, teaching practices will invariably change. Technology becomes an integral part of activity and teachers assume new roles. These examples again illustrate the depth and breadth required of the evaluation framework appropriate for this study, and the importance of understanding a learning environment as a system in a context.

3.3 Methodology

Collins, Joseph, and Bielaczyc (2004) describe design based experiments as being "developed as a way to carry out formative research to test and refine educational designs based on theoretical principles derived from prior research" (p. 18). This study of ePortfolio implementation is typical of the type of research project that entails "progressive refinement" (Collins et al., 2004, p. 18), as a new approach to professional development for technology integration is tested in the real world and modified as a result of experience. This approach to experimentation is particularly useful because it represents a methodology that links practices, issues, and theory. The relationship between these elements within a learning environment is illustrated in Figure 3.1 devised by Brown (1992).

Figure 3.1: The Complex Features of Design Experiment



(Brown, 1992, p. 142)

Collins et al. (2004) believe this methodology is limited because of the difficulty of controlling variables in the real world learning environment of a classroom. The researcher invariably collects extensive data that is difficult to analyse or remains in parts unanalysed. However, design-based experiment does have an important role in educational research. It is a way to apply qualitative and quantitative methods to improve the design of a new approach. This is similar to the way that teachers refine their practices through experience, including their observations, discourse with students and fellow teachers, and by reflecting on the results of written tests. That is, practice is adjusted amidst intense activity. This method of research is therefore highly contextualized and facilitates improvement in practice through an understanding of theory. Lawless and Pellegrino (2007) conclude:

> The design-based approach affords teachers the opportunity to learn how to use specific technologies situated in the context of their curricular needs. As a result, teachers take more ownership of the resources, have higher confidence in integrating the unit as a teaching tool, and are more likely to believe that the curriculum resources will have a positive impact on student achievement (p. 594).

The design-based approach is also appropriate for this study because the purpose was to expand our knowledge of theories rather than to make statistical generalizations to the population. Therefore the focus was on understanding the cases in order to identify critical factors and key variables (Hammersley & Gomm, 2000). To facilitate the collection of data, a qualitative case-study was undertaken at multiple sites. This approach is consistent with investigations of innovative practices at schools and where "independent innovations occur at different sites" (Yin, 1984, p. 47). That is, each of the school sites involved in the study developed ePortfolios as an innovative practice to meet a specific purpose within contextual supports and constraints. The study of cases allows a wide range of features of each case to be investigated (Hammersley & Gomm, 2000), and according to Yin (1984) the involvement of multiple sites provides "more compelling" evidence and a "more robust" (p. 48) study.

In keeping with the constructivist perspective of the project, quantification was not an important aspect of the investigation of any of the research questions. Reeves (1992) says "constructivists generally believe measurement is a futile act because the act of measuring always affects what is being measured" (p. 48). This study acknowledges that the researcher not only influenced the project, but took an active role as described in the next section. However, the environment was not controlled and phenomena occurred naturally. Reeves (1992) takes the middle ground between the constructivists' approach to evaluation which "is virtually to abandon hope that solutions to social problems can ever be found" (Guba & Lincoln, 1989, p. 47) and the desire of objectivists to measure everything. Reeves' (1992) perspective "to use whatever works to improve the decisions people make" (p. 49) was an invitation to seek out any resource that would further the object of the project, and to record information from any source to report the progress of the project. Reeves (1992) goes on to say "the purpose of evaluation is to provide a more rational basis for decision-making than would otherwise exist" (p. 49).

A consideration for the methodology is the need to focus on the learning outcomes of the project as previously raised by Bain (1999). Furthermore, Bober (2001) expresses concern that evaluations of technology integration "may be tending to short term outcomes and effects rather than seeing the interventions as a total package designed to change how schools function" (p. 23). Simplistic evaluations have measured: the change in skills of a sample of teachers; student computer ratio; student access to computers; and the confidence of teachers in using computers. This focus on skills and access ignores implementation processes, learning, and the management of knowledge (Bober, 2001). Bober (2001) continues by saying:

> Few evaluation narratives . . . describe new tools designed to help teachers better visualize technology's potential by allowing them to examine a variety of learning paradigms, determine which of them best suit the instructional settings in which they find themselves, and select instructional technologies that allow these paradigms to flourish (p. 22).

It has been argued in the literature review (see section 2.7) that the concept of ePortfolios allows teachers to visualise and apply a meaningful application of technology. Therefore an evaluation of the project's learning outcomes should not only focus on the implementation of ePortfolios, but also on "how . . . and in what ways . . . does access to and use of technology alter classroom practices? Is teaching transformed?" (Bober, 2001, p. 21). This question continues to be of interest to the wide range of people who are involved in or affected by teaching with technology either directly or indirectly. McNabb, Hawkes, and Rouk (1999) support this view in saying that "stakeholders from the policy level on down to the home, need information on how using technology changes teachers and learning, its organizational impact, and the outcomes that can be reasonably expected at different stages of implementation" (p. 4). These views reinforce the need for the evaluation framework to look beyond the outcomes of discreet activities to the broader perspective of how those activities, as part of a system, contribute to greater teacher efficacy in assuming responsibility for their own learning, and a willingness to change their practices to improve the learning of children.

Jonassen and Rohrer-Murphy (1999) recommend that a variety of data collection methods be employed in studies of constructivist learning environments so that the researcher understands the "activity system" (p. 69) from a number of perspectives. Case-study design is appropriate where a range of data sources is proposed and evidence is in a variety of forms (Yin, 1984). For example, evidence will include: descriptions of contexts; survey responses; narrative accounts; observations; interviews; records of meetings and communications; and samples of ePortfolios that contain photographs and videos.

Jonassen and Rohrer-Murphy (1999) also recommend that research should take long enough for the objects of activity to be understood and for changes in objects and relationships between objects in other settings to be studied over time. This is particularly relevant to the project because the developmental nature of the implementation of ePortfolios is recognised in the literature (see section 2.4.6). At the beginning of the project most participants had nothing more than a concept of ePortfolios and a vision of how that concept may be useful in their context. Many had to develop an understanding of what the technology could do before learning to master the tools and apply that learning in the classroom. The purpose they had in mind for ePortfolios changed over time as they became aware of benefits and limitations, and the difficulties of implementation further shaped the end product or object. The study was conducted over a period of five years, with data collected in the *ePortfolio Project* over a period of three years. This was considered sufficiently long enough for teachers and school administrators to go beyond the concept phase to have not only implemented ePortfolios, but to have modified early attempts. A period longer than three years may have been useful in addressing questions about the institutionalisation of the project in terms of sustainability within and outside the context.

While no pilot study was undertaken, the project was shaped by the reporting of early activities of the ePortfolio network, opportunistic funding, discussions at planning committee meetings, and contact between the researcher and teachers and school administrators. General patterns of activity became apparent and were explored in detail as the concept of ePortfolios gained the interest of participants. For example, early workshop sessions became a model for later sessions and feedback from the sessions influenced activities. Attempts were made to rectify less successful activities as the project progressed, for example, management of the discussion group and The Learning Place project room.

3.3.1 The Researcher as Participant

Jonassen and Rohrer-Murphy (1999) support the view proposed by Kuutti (1991) that activity in a constructivist learning environment may only be studied "in real life practice" (p. 68) with the researcher as an active participant. *Active* in this sense means more than just being another teacher or school administrator implementing ePortfolios, although the researcher did so at his school. It means not only proposing "different views but also to advance the activity as much as possible. In this light activity research can serve as a kind of formative evaluation where the researcher attempts to improve the outcome of the process" (Jonassen & Rohrer-Murphy, 1999, p. 68). To this end, the data will reflect the influence of the researcher as he makes presentations at workshop sessions, prepares and distributes a written information resource that portrays a certain view of ePortfolios, takes the role of network leader, and becomes established as an authority on ePortfolios. At every opportunity the researcher explained to participants how the activities of the network were designed around the principles and elements of a constructivist learning environment that teachers could also apply in their classrooms, i.e., the issue, related cases, information resources, tools, and social and contextual support.

The researcher's influence on the *ePortfolio Project*, though, was limited to the timing, structure, and nature of activities, and participants joined the project or continued involvement of their own free will. That is, it was only their interest in learning about ePortfolios that tied them to the project. In fact, the difficulties that they knew they had to resolve were reason enough for participants to be discouraged and simply fade away. The researcher therefore had to ensure that activities were seen as important to participants and that they ran smoothly and on time. For example, funding for the project meant that activities, including a welcome afternoon tea, could be offered free of charge. The researcher maintained this position even though other members of the planning committee were opposed. His reasoning was that teachers did not have to go to their principals to ask for money in order to participate, making the whole process much simpler.

The participants themselves also became researchers (Mattingly, 1991) as they reflected on their vision for the purpose of ePortfolios and analysed their context to implement ePortfolios. The participants, as professional educators, had to "handle situations for which there are no techniques. They must develop their own kind of artistry, involving reflecting in practice in the midst of intense activity without interrupting the flow" (Schmidt, 2000, p. 269). The teachers had teaching responsibilities and could not stop everything else they were doing to focus solely on ePortfolios. It is this adjustment of practice to allow the development of a newly learned concept within a context that was of particular interest in the study, and therefore the reflections and actions of practitioners were a key source of data.

The notion of "reflecting in practice in the midst of intense activity without interrupting the flow" (Schmidt, 2000, p. 269) also applied to the researcher, who had full time responsibilities as a primary school principal during the whole period of the study. A disadvantage was that some activities were delayed because the researcher had to attend to other matters. That is, the study may have progressed at a faster rate or with more intensity if the researcher was not a full time principal. An advantage was that the study was authentic, reflecting limits to the time that principals have available to support initiatives across education districts. Other factors also dictated the pace of the project, for example, teachers and school administrators needed time to absorb the concept, to gather resources, and to trial and adapt ePortfolio frameworks.

3.4 Data Collection

The data collection process was characterized by a looseness of design to allow flexibility to pursue leads arising from the data. The progress of the *ePortfolio Project* was difficult to predict because it depended on uncontrolled factors such as the sustained interest of individuals and the availability of funding. While participants in each activity were made aware that information relating to the project was being recorded as part of a study, only those who had a specific role to play were formally enlisted as subjects, e.g., members of the planning committee and project managers and principals of schools provided with funding. That is, participants were involved in the study through their desire to learn about ePortfolios, and data were collected as part of everyday management processes including minutes of meetings, evaluation reports from workshop sessions, submissions for funding, reports to supervisors, and messages between participants. Data displayed in appendixes C-F provide a chronological and realistic picture of the project as it was designed, developed, and implemented.

A loose design also took advantage of the researcher's experience as a principal, so that the phenomena could be explored further than by someone who was not familiar with the details and subtleties of schools (Miles & Huberman, 1994). That is, time did not need to be wasted becoming familiar with the context. The nature of the information being sought and the questions that needed to be asked were known, and there was no reason to plan through prior instrumentation (Miles & Huberman, 1994). Questions could be focused so that the amount of information was limited, which assisted in the organization and later analysis of that information.

Strategies used in formative evaluation were ethnographic and included expert review, interviews, observations, and analysis of documents. According to Mercer, Littleton, and Wegerif (2004):

> Ethnographic analysis aims for a rich, detailed description of observed events which can be used to explain the social processes which are involved . . . [It is] common practice [for ethnographers] to tape-record talk, to transcribe those recordings, and to report their analysis by including short extracts from their transcriptions. Ethnographers are normally concerned with understanding social life as a whole, and while they record what is said in observed events, language use may not be their main concern (p. 200).

The collection of data in the *ePortfolio Project* was organised around four major sources: case studies of teachers and school administrators; the evaluation of workshops; a review of the literature; and reviews by the researcher, peers, and experts. A review of the literature contributed to the design and development of the project in four ways. First, it contributed to an analysis of the context, which is an important process in designing effective activities and utilising available resources. The literature review assisted the researcher to foresee and avert barriers in the implementation phase, as well as to anticipate and maximise potentially positive factors. The researcher either acted on that information himself, or alerted others involved in planning the project. Second, the literature review was an opportunity to perform a needs and task analysis in order to understand the participants as learners and the goals of the learning as described in section 2.3.1. Third, the literature review provided an understanding of the theory driving the design and development of the project including learning theory, situated cognition, activity theory, constructivist learning environments, and case-based reasoning. Reviews of similar studies and the results of a previous study by the researcher (Otto, 2003) also contributed to the design and development of the project. Fourth, the review of the literature contributed to the information resources made available to the participants as one of the strategies to support their learning.

Reviews by the researcher, peers, and experts were used as a monitoring tool to chart the progress of the project and to initiate modifications. A planning committee met regularly throughout the reporting phase of the project, and was made up of school administrators who are experts at implementing educational programs and support programs for teachers in their schools. The Principal Education Officers (Performance Measurement) from Toowoomba and The Downs Education Districts were also members of the planning committee. These officers are responsible for implementing and managing support programs across districts of schools. The researcher has an extensive record in educational leadership with 30 years experience as a principal, as well as academic qualifications relating to leadership to doctoral level. The researcher attended two national forums on ePortfolios and prepared a comprehensive information resource on ePortfolios from a literature review. Interviews and survey responses were also sought from principals and other perceived experts such as the Co-ordinator of the Toowoomba Technology Maths and Science Centre of Excellence. Teachers and school administrators participating in the project were regarded as both peers and experts, and provided feedback by way of surveys and interviews.

3.4.1 Instrumentation Description

Four survey instruments were administered to collect data in the *ePortfolio Project*. The first survey instrument was designed to gather feedback from participants to evaluate workshop sessions (see appendix C.1). Participants rated each session on a five point Likert scale listing the numbers one to five, and a column was provided for comments. A section was added for general comments, and a heading advised that the feedback was needed "to help us plan to meet your needs." This survey instrument was simple in design because it was completed by participants after two or more hours of intensive work.

The second survey instrument requested teachers and school administrators to nominate topics for future workshop sessions in order of priority. This survey instrument was included in the nomination form for the workshop session in March, 2005 (see appendix D.24), and in the feedback survey for participants in the workshop session in May, 2005 (see appendix D.26).

The third survey instrument was an expression of interest that school administrators were required to complete if they wanted to access ten days of teacher release to support the development of ePortfolios in their schools and to respond to requests from other schools for support. Applications could be made on behalf of an individual teacher or a group of teachers, and the following information was sought to assist the planning committee to choose recipients:

1. involvement with ePortfolios so far;
2. vision for the design and application ePortfolios;
3. available resources;
4. proposed use of teacher release days;
5. school contribution; and
6. other information.

This survey contributed valuable data about the vision that teachers had for ePortfolios at the beginning of the project, that could be compared with their vision for ePortfolios after learning activities had been implemented.

The fourth survey instrument had a variety of formats to correspond with the different ways in which it was used. This instrument was derived from the following list of questions prepared from the literature review to stimulate thinking about ePortfolios. Variations to the questions shown in brackets allow this list of questions to be answered by those who have already implemented ePortfolios and those who are intending to implement ePortfolios:

1. What is your context?
2. What purposes do ePortfolios have (or you envision them having) in your school?
3. What do you consider to be important elements in the design of ePortfolios?
4. What software do you prefer to organise and view the children's work e.g., FrontPage, PowerPoint?
5. What software do you prefer for publishing and editing e.g., Word, Publisher, video editing?
6. What hardware is needed?
7. How have you solved (or how would you solve) the problem of data storage?
8. How have you solved (or how would you solve) the problem of time management?
9. What other issues have you solved (or think would need to be solved)? Try thinking aloud as you solve a problem or recall your thinking as you solved a problem.

10. If ePortfolios are used in a classroom, how do you (or would you) monitor the curriculum to ensure core outcomes and literacy and numeracy skills are still being covered?
11. What changes have you observed in the practices of teachers who have implemented ePortfolios?
12. Are your ePortfolios teacher centred or student centred? Why?
13. How have ePortfolios changed (or are likely to change) conversations between teachers and students, teachers and parents, and students and parents?
14. How have ePortfolios changed (or are likely to change) the use of technology in your school?
15. What literature have you read about ePortfolios? How have you found and accessed that literature? What articles or commentaries in articles have influenced your thinking? Why?
16. Have you seen examples of ePortfolios in other schools? What aspects appeal/not appeal to you?
17. What documents have you written as you solved problems or informed people about ePortfolios e.g. school policy, staff notes, school newsletters (collect and forward please). What documents support your program e.g., lesson plans and curriculum frameworks?
18. What conversations have you had with teachers, parents and students about ePortfolios? Have a conversation with another teacher or principal and list the concepts that emerged.

One way in which the instrument was used was to collect participant contributions to a paper to be submitted for the Society for Information Technology and Teacher Education International Conference in 2005 (see appendix D.11). Principals from a primary and high school and the two Principal Education Officers (Performance Measurement) from Toowoomba and The Downs Education Districts were asked to respond to the questions. An alternative offered to answering the questions was for these participants to tell a story of how ePortfolios had developed or would be developed in their schools or districts. None of the participants took up this offer, seeming to prefer the structure of a list of questions. The responses were included in the data set for this study because they represent the reflections at that time of two school administrators and two district personnel (see appendix D.12-15). Each of these participants had a role in overseeing the professional learning of teachers either within their schools or across the districts.

The list of questions that make up the fourth survey instrument was made available to teachers and schools administrators through The Learning Place project room (see appendix D.7), distributed at workshop sessions, and was included in the information booklet prepared by the researcher titled *ePortfolios: A learning tool* (see appendix E.3.18). The purpose of the list was to stimulate thinking about the issues that needed to be addressed when implementing ePortfolios, and in another format, the list was designed to be used as a planning tool (see appendix E.2).

Another variation of the list of questions sought responses from the project managers and principals of schools that had received funding from the ePortfolio Alliance (see appendix C.2). This list included questions about the design and conduct of the professional learning experiences organised by the ePortfolio Alliance. Besides providing data for the study about the progress participants had made in applying their learning to implementing ePortfolios, these responses were also redrafted in the form of a case that could be made available to other schools though The Learning Place project room.

Participants completed the following survey at the end of each of the *Success for Boys* Core Module workshops:

1. How important is it to improve boys' success (indicate on a five point Likert Scale)?
2. Why?
3. What new information did you find significant?

4. What will you consider doing differently?
5. Has the session provided a workable plan of action (indicate on a five point Likert Scale)?
6. Please comment on the plan of action.
7. Which other modules would you like to attend?
8. Please rate the presentation (indicate on a five point Likert Scale) and provide comments;
9. Please rate the venue and meal (indicate on a five point Likert Scale) and provide comments; and
10. Other comments.

3.4.2 Population and Sample

The population for the study was teachers and school administrators employed by Education Queensland. This group had similar professional learning opportunities, shared a curriculum, and experienced the goals, structure, and expectations of the one education system. The sample frame (Fowler, 1988) included teachers and school administrators who had an interest in the three projects, i.e., developing and implementing ePortfolios, improving the success of boys, and investigating the contribution that ICTs can make to Mathematics. Experience ranged from beginning teachers to teachers and school administrators nearing the end of long careers in Queensland schools. Pre-service teachers from the University of Southern Queensland became aware of the *ePortfolio Project* through field experiences and attended some workshop sessions.

Because the researcher was a principal of a primary school in the Toowoomba Education District, he was able to maintain contact with participants and take an active role in the *ePortfolio Project*. Many participants knew the researcher prior to the commencement of the project, and would have formed opinions about his capacity to lead and sustain the project. While there were advantages to be derived from this situation, it was also problematic. The researcher's world view, perceptions, beliefs, assumptions, and judgments could have filtered the type of questions asked and the reaction to responses (Barone & Switzer, 1995). Prior instrumentation would have exacerbated this problem because phenomena not in the instruments may be excluded (Miles & Huberman, 1994). In recognition of these problems, items in instruments requiring written responses were open ended, and participants were encouraged to add other comments. By being included as one of the participants, the researcher could account for the beliefs and understandings he brought to the study (Miles & Huberman, 1994). The involvement of other participants in similar circumstances as the researcher, for example, other principals of primary schools, produced a range of responses that could be identified as being similar to, or different from, the researcher's responses.

The sample of teachers and school administrators who contributed to the cases was self-selected through their interest in developing and implementing ePortfolio frameworks in their schools. One participant took up the option of not being identified in reports. One group of teachers and school administrators within the sample of cases had been working on ePortfolios before the project started and gave presentations of their work at the earlier workshop sessions as exemplars, at least until sufficient cases were generated through participation in the project. These schools included: Woodcrest State College; Pozieres and Gatton State Primary Schools; and Crow's Nest State P-10 School.

Another group of teachers and school administrators joined the sample of cases when they submitted an expression of interest for funding of $A2700 each to release teachers from classes so they could develop ePortfolio frameworks. This group became the sample for the survey in appendix C.2. The funding was only available to Toowoomba Education District schools, and the project planning committee ensured that a cross section of schools was represented, including small, medium, and large primary schools, high schools, and special schools. This consideration was also beneficial for the purposes of the study in that cases from a range of school types and sizes could be recorded. A selection process proved to be unnecessary as nominations were received from an appropriate cross section of schools and all final submissions were approved. The group included: Clifford Park Special School; Helidon, Glenvale, and Wilsonton Primary Schools; and Centenary Heights State High School. The researcher, as principal at Withcott, withdrew the school's submission so that sufficient funds could be distributed to the other schools. The two key personnel involved in ePortfolios at Withcott at that time, the researcher and teacher librarian, did not have full time class responsibilities and therefore did not have as great a need for teacher release as other schools. A key participant at one of the schools that received funding preferred to remain anonymous. In order to comply with this request, information from that school has not been included in the data set for the study. Another school of a similar size and type was included in the group of funded schools, so the effect on the collection and interpretation of data was minimal.

Participants at the ePortfolio workshops varied from session to session. The dates for sessions were known and advertised at the beginning of each year, and nomination forms were sent by email to schools and individuals two or three weeks before each event. All nominations were received by the researcher at his school, and participants returned the nomination form by email or fax, or contacted the researcher by telephone. A list of participants and their schools was created for each session to assist with catering. These lists provided information about the number of schools represented at sessions, and the number of sessions each participant attended. Participants were asked to complete the evaluation survey in appendix C.1 before leaving.

Membership of the planning committee also varied from meeting to meeting. These participants contributed valuable information as a group through their decision making and support of the network, and also as individuals, e.g., by responding to a variation of the survey in appendix C.2.

There was sufficient interest in the development and implementation of ePortfolios so that the loss of a participant or school as a case was not a critical issue. However, the reasons for a participant choosing not to participate after demonstrating initial involvement would be of interest. This did not occur, and reasons would have been pursued only within ethical guidelines.

3.4.3 Data Collection Procedures

Involvement in the *ePortfolio Project* required considerable commitment from participants. For example, members of the planning committee met each school term, and teachers and school administrators attended workshop sessions and co-ordinated the implementation of ePortfolio frameworks in their classrooms or schools. This required issues to be resolved, tools to be mastered, and ideas to be contemplated. Data collection procedures were specifically designed to be unobtrusive and not detract from the objective of the project, which was to support teachers and school administrators in their professional learning about ePortfolios.

Data collection was continuous throughout the three years of the reporting phase of the *ePortfolio Project*. Much of the activity was already recorded in digital format, including minutes of meetings, evaluation reports from workshop sessions, submissions for funding, reports to supervisors, messages between participants, ePortfolio exemplars, and PowerPoint presentations. After each episode in the activity system, data were recorded as a Word file and added to the chronological collection displayed in appendixes D to F. Each recording of an episode included details about the event, a summary of activities within the events or a transcript of what was actually said or presented. In this way the researcher was able to maintain an overall picture of activities and how they related to each other. For example, if it became apparent that there was a gap in the information available to participants, then a resource could be prepared. This approach also allowed the researcher to respond to opportunistic sources of information in the building of cases. For example, an email may contain valuable data, and could readily be added to other data relating to that site. Consequently, there was a mechanism for the researcher to collect and record data from a wide range of sources, and to respond to the needs of teachers and school administrators in supporting their professional learning.

Participants were advised that participation was voluntary and that they could withdraw at any time without giving a reason. Permission was requested before a meeting was audio taped or video taped. The researcher's contact details were provided on all information distributed as part of the project, including email address, work address and telephone number. Participants and the principals of schools identified in the data were given the option of anonymity, and provided with relevant drafts to ensure responses had been interpreted correctly. Participants were also advised that a copy of the final report would be made available to them on request.

3.4.3.1 Surveys

The survey in appendix C.1 was distributed to participants at workshop sessions and collected at the end of the session. Comments were typed into a Word file and the mean calculated for responses on the Likert scales. These evaluations were included in the data set, and also forwarded to session presenters, members of the planning committee, and education district supervisors to inform them of the achievements of the project. The lists of questions and instructions in appendix C.2 were emailed to project managers and principals who were funded to develop ePortfolio frameworks in their schools. Participants were asked to return responses by email so that the information could be readily copied and pasted into the data set. Participants were given the option of printing a copy of the survey and returning responses in written format, though no-one took up this offer. A survey was distributed to participants at the conclusion of each of the *Success for Boys* Core Module sessions. The questions devised for the survey may be viewed in appendix G.4

3.4.3.2 Presentations and ePortfolios

Teachers and school administrators who developed ePortfolio frameworks in their schools presented their work at workshop sessions. The Gatton, Woodcrest, and Wilsonton presentations were video taped with permission, while presenters from Withcott, Pozieres, Clifford Park, and Glenvale provided copies of their notes and PowerPoint presentations. Information from these presentations, including the ePortfolios created by children, was redrafted in the form of a written case. The cases contributed to the data set in appendix F, and were made available to participants through The Learning Place project room. The transposing of electronic data into a written format enabled the privacy of children to be protected, which may have been compromised if actual ePortfolios were used as exemplars. The *print screen* facility was used to take images of pages of the ePortfolios. The images were opened in Microsoft Paint and faces and other identifying elements were removed using the *duster* and *fill* options. The images could then be safely included in the cases, along with a description if necessary of the original pages.

3.4.3.3 Interviews

An opportunistic interview was held with a teacher at Crow's Nest early in the project. This teacher became enthused about the concept of ePortfolios at the inaugural network meeting and used his considerable experience in ICTs to build a framework over the following few weeks. This particular work was of interest because of its direct link to a project activity. The progress of this teacher in adopting ePortfolios was able to be evaluated by analysing his presentation at a later workshop.

Interviews were used as a tool to fill any gaps in the data. For example, the work of the co-ordinator of the *ICTs in Mathematics Project* was of particular interest. With assistance from the researcher, she had developed and implemented a constructivist learning environment as the instructional design for the project. During an interview she reflected on the usefulness of the design, which was the subject of research question two.

Narrative research techniques were an important feature of these interviews. According to Mattingly (1991), narrative accounts focus on the changes that occur through the actions of people, and that "simply asking practitioners to reflect on the stories they already tell can provide a natural bridge to a serious enquiry about the very deepest layers of value and belief that undergird the decisions they make" (p. 255). The interviews were unstructured to allow participants to narrate the issues that were important to them, and because the researcher was experienced and comfortable in talking with other educators (Minichiello, Aroni, Timewell, & Alexander, 1995).

A literature review of best practice was undertaken to gain the most from the interview process and to ensure high ethical standards. According to Barone and Switzer (1995), probing is one technique to gain more information in an interview. Probing questions follow up the primary questions and are important to clarify incomplete or vague statements, or to pursue an issue. These questions may confront the interviewee with alternative arguments in a devil's advocate style, or pose a hypothetical question that suggests a different scenario, or elicit a comparison between an ideal situation and what is really occurring. Probes may also be used to check that a particular response has been understood or to summarize the participants' approach to an issue (Minichiello et al., 1995). Minichiello et al. (1995) advise that people have the capacity to simultaneously hold contradictory views. Therefore, cross-checks need to be applied to uncover those beliefs that are more dominant than others. In checking the consistency of statements, the interviewer must be familiar with statements or views previously expressed by the participant, either in response to other parts of instruments, or during the interview. The participants could be confronted sensitively with evidence of inconsistencies by statements such as "I'm a little confused."

Another interview technique is nudging. A question may need to be repeated if the interviewee is losing track, or the answer may be paraphrased and directed back to the interviewee for reflection (Minichiello et al., 1995). Non-verbal nudging includes body language, silence, eye contact, quizzical facial expression, and nodding of the head (Barone & Switzer, 1995). It was also important to be aware of the structure of interviews. That is, they have a beginning, topical section or middle, and a closing (Minichiello et al., 1995).
According to Barone and Switzer (1995), listening is a process that is creative, intentional, dynamic, selective, visual, aural, interpretative, and involves response. Participants were aware of feedback, a sign that the interviewer was interested, and were encouraged to carry on (Barone & Switzer, 1995). The process was viewed as two-way communication rather than an interrogation, with the participants knowing their comments were supported (Minichiello et al., 1995). This is called empathic listening and involves "'smiling' with your eyes, nodding, and making 'listening noises'" (Minichiello et al., 1995, p. 102).

The interviewer analysed his behaviour during the interview (Minichiello et al., 1995). For example, the interviewer was attuned to perceptions relayed to the participant, took note of personal involvement in the social interaction of the interview, focused on language and body language, and linked information to previous statements. In arranging the interview, obstacles to good listening were considered, including lighting, seating, spatial arrangements, temperature, sound, and visual distractions (Barone & Switzer, 1995).

3.4.3.4 Online interactions

As an active participant in the project, the researcher was able to capture data of interest relating to online interactions because one of the collaboration tools was computer-mediated communication (CMC). One form of CMC was an email discussion list, which was advertised in the information distributed about workshop sessions. Instructions about how to access the discussion list were given at each of the workshop sessions. Members of the discussion list could send an email to everyone else on the list, and a copy would also be forwarded to the researcher.

Another form of CMC involved emails sent between participants and between participants and the researcher. The researcher could not account for emails sent between participants. But as project leader he had a key role in fielding queries about ePortfolios and the project from teachers and school administrators, as well as other interested people such as education district office and university personnel. The Principal Education Officer (Performance Measurement) of the Toowoomba Education District fielded many email queries through his position about the project and related issues. As a member of the planning committee with an ongoing interest in the project, this person would forward these emails to the researcher.

Participant use of CMC in the project was of interest because it was a tool intended to enhance collaboration. As suggested by Mellar and Howell-Richardson (1999), data were collected about the various forms of CMC employed, how those forms of CMC compared with face-to-face and telephone communications, and whether or not CMC is used or useful in an educational context. The data collection techniques reviewed by Mellar and Howell-Richardson (1999) also apply. First, a simple quantitative technique of counting discussion entries and noting distribution will provide sufficient information about the use of CMC in collaboration and the effect of point in time strategies to increase such usage. Second, a content analysis of CMC provides data about the type of information being shared among participants, or problems being solved using collaboration. While there are more sophisticated methods of collecting and analysing CMC related data, these two techniques were adequate for the purpose of the study.

3.4.3.5 Documents

Most documents relating to the study were in electronic format. For example, meeting agenda and minutes were prepared using Word and emailed to planning committee members. Notices of workshop sessions were also prepared in Word and emailed to all principals in the Toowoomba and The Downs Education Districts and to interested teachers and school administrators outside the two districts. Relevant information from these sources was copied into the appendixes and summarized into a manageable format.

3.5 Data Analysis

Jonassen and Rohrer-Murphy (1999) explain that activity theory "focuses on the interaction of human activity and consciousness (the human mind as whole) within its relevant environmental context" (p. 62). This is consistent with the orientation of a constructivist learning environment which focuses on the design of activities and understanding the learner and the context of the learning. Activity theory is concerned with the linkages between actions and thinking. That is, "we cannot act without thinking or think without acting" (Jonassen & Land, 2000, p. v), and it is the process of reflecting on those actions from which meaning is derived. When activity theory is applied to the analysis of data the unit of analysis is activity and the focus is on describing components of the activity system and its dynamic relations. Generally accepted practices have arisen from this application, and Jonassen and Rohrer-Murphy (1999) propose six steps in the process in Table 3.2.

Table 3.2: Six Steps in the Analysis of Data

Step One	Understand relevant context(s)
	Understand the subject
Step Two	Define the subject
	Define the relevant community
	Define the object
Step Three	Define the activity itself
	Decompose the activity into its component actions and operations
Step Four	Analyse tool mediators and mediation
	Analyse rule mediators and mediation
	Analyse role mediators and mediation
Step Five	Analyse internal or subject-driven contextual bounds
	Analyse external or community-driven contextual bounds
Step Six	What are the interrelationships that exist within the components of the system?
	How formally established are those relationships?
	How have those relationships changed over time?

(Jonassen & Rohrer-Murphy, 1999, pp. 71-77)

Activity theory is particularly useful in consideration of the formative aspects of evaluation (Jonassen & Rohrer-Murphy, 1999) and the six steps align with the design and development phases of the Learning Centred Evaluation Framework (Bain, 1999) that has been adapted for this study. The design phase is to investigate and plan activities, and the development phase is to trial and modify the activities. The steps proposed by Jonassen and Rohrer-Murphy (1999) have been adapted in the Professional Development Framework in appendix B, and take the form of a series of questions that the researcher is to address in analysing the data.

While the constructivist learning environment was made up of a variety of activities to address each of the five elements, it was also viewed as a whole system (Salomon, 1996). Therefore an evaluation of new knowledge, understanding, and skills attained in each activity told only part of a participant's story of development. Of importance was the participant's identity as a learner and the changes in practices implemented as a result of their learning (Greeno & the Middle School Mathematics Through Applications Projects Group, 1998). The Professional Development Framework (see appendix B) was a valuable guide in the design of data collection tools to investigate the effectiveness of both discrete activities and the project as a whole.

Two focus areas suggested by Crompton (1996), effectiveness and efficiency, were useful in the analysis of data relating to summative evaluation processes in the implementation and reflection phase. Reigeluth (1999) provides the following definitions:

1. Level of effectiveness is a matter of how well the instruction works, as indicated by how well (to what degree of proficiency) the learning goals are attained; and
2. Level of efficiency is the level of effectiveness divided by the time and/or cost of instruction (pp. 9-10).

The importance of the task analysis described in section 2.3.1 is apparent when the project manager is faced with the task of determining how well the learning activities contribute to meeting the goals of learning. Both the effectiveness and efficiency of the project will be of interest to the instructional designer who will make recommendations about how activities could be better designed and implemented. These recommendations will also be of interest to sponsors of the project, e.g., the Australian Government Quality Teaching Programme, as well to as the education organisation and to those who are considering replicating the project.

The sustaining of learning and the sustaining of new practices were critical focus areas in the analysis of data relating to the institutionalisation phase of the project. Three questions in the Professional Development Framework (see appendix B) were designed to guide the collection and analysis of data relating to this phase:

1. What needs to happen to sustain learning?
2. What needs to happen to sustain changes in practices? and
3. What were the benefits to the organisation?

Argyris and Schön (1996) believe that benefits to an organisation begin with a problem encountered by an individual within that organisation:

> [The individual] experience[s] a surprising mismatch between expected and actual results of action and respond[s] to that mismatch through a process of thought and further action that leads them to modify their images of organisation or their understandings of phenomena and to restructure their activities so as to bring outcomes and expectations into line, thereby changing organisational theory in use (p. 16).

The learning that occurs through the thought and actions of the individual becomes organisational when other individuals in the organisation arrive at the same understanding and the learning is reflected in artefacts of the organisation, including maps, programs, and the memories of members (Argyris & Schön, 1996).

The learning that may occur as a result of an individual initiating a response to a problematic situation in an organization may include:

1. interpretations of past experiences of success or failure;
2. inferences of causal connections between actions and outcomes and their implications for future action;
3. descriptions of the shifting organizational environment and its likely demand on future performance;
4. analysis of the potentials and limits of alternative organizational strategies, structures, techniques, information systems, or incentive systems;
5. descriptions of conflicting views and interests that arise within the organization under conditions of complexity and uncertainty;
6. images of desirable futures and invention of the means by which they may be achieved;
7. critical reflections on organizational theories-in-use and proposals for their restructuring; and

8. description and analysis of the experiences of other organizations (Argyris & Schön, 1996, p. 17).

Several of these areas of learning are consistent with the goals of the *ePortfolio Project*. For example, the classroom implementation of ePortfolios provides an image of how learning can be organized in the future and provides a vehicle for that image to be achieved. Technology in schools is causing a shift in the organizational environment, and ePortfolios represent a process to respond to that shift. The organizational learning that occurs at this level is referred to by Argyris and Schön (1996) as double loop learning. Again, this is consistent with the goals of the *ePortfolio Project* in that from the outset the intention was to change the values and beliefs of teachers, and to have those changes migrate across the educational organization.

Robinson (2001) makes an additional point by saying "if existing organizational routines are preventing learning that which is desired, then identifying and altering what is dysfunctional is of necessity a highly deliberative process" (p. 61). At the micro level, analysis of the data relating to the *ePortfolio Project* should reflect those routines within the educational organization that are preventing learning. At the macro level, analysis of the data should address the following question: Would ePortfolios, as a desirable activity within the educational organization, have been implemented in classrooms without the deliberate intervention of the *ePortfolio Project*?

3.5.1 Coding of the Data

Jonassen and Rohrer-Murphy (1999) recommend that researchers first identify broad patterns within the activity system that point to the overall direction of the project and its significance. They should then investigate specific episodes of activity for a more detailed analysis. The data, as displayed in chronological order in appendixes D to F, were therefore first coded as relating to one or more of the four main phases of design, development, implementation, or institutionalisation. In a series of coding processes to identify general and then specific patterns, descriptive codes were assigned to pieces of data. Codes referred to acts, activities, meanings, participation, and relationships (Miles & Huberman, 1994), as well as the setting or context, perspectives or ways of thinking, processes, events, strategies, and methods (Bogdan & Biklen, 1992). As advised by Miles and Huberman (1994), codes reflected the concept they were describing and numbers were not used. The act of coding was in itself a process of analysis, because choices were made about the importance of particular pieces of data and meaning was attached to words. Care was taken that meaning and relationships were not lost through pulling apart and combining data. The application of descriptive codes summarized and organized the data and pattern coding directed attention to emerging themes and explanations of "why" and allowed concepts to be compared across cases. Miles and Huberman (1994), though, warn against "getting locked too quickly into naming a pattern, assuming you understand it, and then thrusting the name onto data that fit it only poorly" (pp. 69-70). Furthermore, the researcher needs to "work with loosely held chunks of meaning, to be ready to unfreeze and reconfigure them as the data shape up otherwise, and to subject the most compelling themes to merciless cross-checking" (Miles & Huberman, 1994, p. 70).

Data were summarized and analysed as soon as possible after collection. Miles and Huberman (1994) suggest this allows the researcher to reflect on the quality of the data, and to record:

1. what is known;
2. what is puzzling, strange or unexpected;
3. what is the state of rapport with people;
4. what additional analysis is needed of existing data;
5. what is definitely not true of the case at this point; and
6. what probably will happen over the next few days/week (p. 77).

3.5.2 Selection and Organization of Data

The selection of data and its organisation to facilitate retrieval and display was a further act of coding and contributed to the process of analysis. For example, data were organised for display in appendixes D-F to correspond with the elements of a constructivist learning environment.

Appendix D, Network Activities, is organised into chronological order to highlight the developmental nature of a constructivist learning environment. This appendix is a record of the activities that were guided by the principles of constructivist learning environments and included: representing and manipulating issues; accessing the information resources listed in appendix E; sharing the cases in appendix F; using and learning to use tools for knowledge construction, knowledge modelling, and conversation and collaboration; and providing social and contextual support (Jonassen, 1999).

Appendix E, Information Resources, comprises information and links to information used to support participants in their professional learning about ePortfolios. Participants were given copies of these resources or could access them on CD-ROM or at The Learning Place project room. The information was intended as background and stimulus material or just-in-time learning about ePortfolios. The literature review undertaken for this study contributed to a booklet titled *ePortfolios: A learning tool*, while other information was derived from educators in the field who were developing ePortfolio frameworks.

Appendix F, Cases, is a summary of ePortfolio frameworks and participant reflections collected in the field from ten sites. As described earlier, the first step in building a case library is to identify skilled practitioners (Jonassen & Herandez-Serrano, 2002). The concept proposed by Wang et al. (2003) of a *knowledge scout* applied in the study. For example, members of the planning committee or participants at workshop sessions would identify practitioners who were developing ePortfolio frameworks, and nominate those people as potential presenters of exemplars. Further evidence of the role of knowledge scouts became apparent when an article relating to ePortfolios was forwarded to the researcher by a participant (see appendix D.22.h).

The second step in building a case library is to show a problem to a practitioner. At the commencement of the project, it was envisaged that it would be necessary to develop a short video or PowerPoint presentation to explain to participants the issues they were likely to encounter when implementing ePortfolios. This became unnecessary, because while the concept of ePortfolios is a powerful one, it is also simple. That is, participants had only to be told that an ePortfolio is a collection of children’s work in electronic format, and their own experiences as educators allowed them to make the leap from concept to practice and to be reflective about the problems that would need to be solved. Cases presented at the early workshop sessions also revealed problems that would be encountered. As professional educators who are frequently called upon to describe their work and make subjective judgements, the participants readily recounted their solutions to problems as proposed in the third step in building a case library.

The fourth step in building the case library was to present the cases and to highlight what the stories teach. Teachers and school administrators who had developed and implemented ePortfolio frameworks presented their work as cases at the beginning of each workshop session. As the project progressed, these sessions were videoed for distribution to schools on CD-ROM.

Jonassen and Herandez-Serrano (2002) propose a series of questions in Table 3.3 that facilitate retrieval of information from cases by providing examples of index categories and indexes. These questions helped to define “what the stories teach” (p. 71), and were used to analyse the cases as a precursor to responding to the broader questions listed in the project evaluation framework (see appendix B).

Table 3.3: Indexing Stories

Index Categories	Indexes
1. Problem-situation-topic Indexes	
	a. What were the goals-subgoals-intentions to be achieved in solving the problem or explaining the situation?
	b. What constraints affected those goals?
	c. Which features of the problem situation were most important and what was the relationship between its parts?
	d. What plans were developed for accomplishing goals?
2. Solution Indexes	
	a. What solution was used?
	b. What activities were involved in accomplishing the solution?
	c. What were the reasoning steps used to derive the solution?
	d. What expectations did you have about the results?
	e. What acceptable, alternative solutions were suggested but not chosen?
	f. What unacceptable, alternatives solutions were not chosen?
3. Outcomes Indexes	
	a. Was the outcome achieved?
	b. Were expectations violated?
	c. Was the solution a success or failure?
	d. Can you explain why any failures occurred?
	e. What repair strategies could have been used?
	f. What could have been done to repair the problem?

(Jonassen & Herandez-Serrano, 2002, p. 72)

Other sources in the literature also supported the analysis of data. For example, the Professional Development Framework (see appendix B) included questions relating to changes in the conversations and practices of teachers. Authorities to support judgements and comments were proposed in the literature review and included:

1. the mapping of teacher styles on a continuum from traditional to constructivist (Ravitz et al., 2000);
2. the eight level continuum of changes that may be observed when a curriculum enriched by technology is implemented (Moersch, 1996-97);
3. the Levels of Instructional Practices framework which is a scale of three levels for each of the five areas of materials, activities, strategies, evaluation, and technology (Moersch, 1996-97);
4. the five stages in the changes teachers made to their instructional strategies as they integrated technology (Sandholtz & Ringstaff, 1996); and
5. the attributes of traditional and integrated classroom environments, including the role of the child and teacher, the use made of technology, and the organization of the curriculum and the classroom (adapted by Ertmer et al., 2000, from the work of Grabe & Grabe, 1996).

Appendix G is a summary of the data collected during the *Success for Boys Project.* The summary includes information about how the project was developed, the evaluation of workshops, and a report on the implementation of the project at Withcott State School. Appendix H describes the *ICTs in Mathematics Project* and includes an interview with the project co-ordinator. Appendix I is a summary of the efforts by the researcher to have the Professional Development Framework adopted by an education region.

3.6 Controls for Threats to Internal Validity

As stated earlier, the researcher could account for the beliefs and understandings he brought to the study because he was included as one of the participants (Miles & Huberman, 1994). It was also important to account for his actions in leading the project so that recommendations could be generated about the role of school administrators in leading professional learning.

The potential for unintended and reactive measurement effects (Ball, 1997) was reduced in the study, because there was no reason for participants to behave any differently to the behaviour of participants in other projects conducted at the same time. While the researcher had certain skills developed through previous research and was identified by participants as a researcher, he was a principal in a region he had served for 30 years. That is, he was readily accepted as a school administrator undertaking a project to assist teachers and school administrators in their professional learning. Other school administrators in the region were leading other professional learning projects at the same time and received funding from the same source. An evaluation process was a necessary part of these projects in order to comply with Australian Government audit requirements. Data for the study were collected as part of the learning and evaluation processes associated with the project, rather than as a specific requirement of the study. The difference between this project and the others was that activities were guided by theory relating to constructivist learning environments.

Information was cross checked and matched from multiple sources, for example, written responses, interviews, and documents. Participants were provided with copies of the displayed data and results to check and verify interpretations. Meetings were held with participants as necessary.

3.7 Controls for Threats to External Validity

Generalizations able to be applied to the population were restricted by the sample size of ten cases of ePortfolios and the involvement of participants across one of the nine education regions in the State of Queensland. However, Gunn (1999) believes the qualitative sources of data applied in "building rich descriptions" (p. 198) of each case are able to "shed light on issues such as how learning occurs and why, what [learners] actually do when they are working with multimedia, and how their perceptions and attitudes towards it may influence the effectiveness of use" (p. 198). This is in keeping with the stated objective of the study, which was to expand our understanding of theories through a focus on understanding the cases (Hammersley & Gomm, 2000) and seeking practical understanding of meanings and actions (Miles & Huberman, 1994). The advantage of the case study methodology was that a large amount of data could be analysed about each case, as reflected in the size of appendixes D-I.

Gunn (1999) suggests that longitudinal studies such as this one carried out over a five year period "allow the continuous process of implementation, evaluation and modification to prove its worth, and to identify the institutional issues that need to be addressed to sustain progress with innovative teaching and learning methods" (p. 198). During the three years that the *ePortfolio Project* was active, participants had time to absorb the concept of ePortfolios, to introduce ePortfolios to their classrooms and schools, and to reflect on and modify those initial ePortfolios. This period of time also allowed the concept of ePortfolios and information about the project to saturate the two education districts either by word of mouth or other communication processes. The project was able to develop a reputation for quality activities and feedback from participants allowed activities to be modified from one session to the next so that they were more effective.

3.8 Ethical Issues in Data Collection

Education Queensland and the ethics committee of the University of Southern Queensland approved clearance for the study. The researcher informed participants at planning committee meetings and workshop sessions that the project was being reported in a study.

Participants and the principals of schools named in the report provided written consent. Other participants accepted that reporting of the names of people and schools would gain recognition for the effort they were contributing towards the development of ePortfolio frameworks. Most of the data relate to the solving of problems that teachers and school administrators encounter on a daily basis, for example, storage of data, access to hardware, and motivating children. Data that potentially could be interpreted as reflecting negatively on individuals, related to their ability to use technology. However, teachers were open about what they could and could not do with technology, and appreciated the opportunity to develop their skills in the workshop sessions. That is, a limitation in technology skills was a factor common to most participants and therefore was not an issue that would cause an individual to be singled out as an exception. Even participants who were regarded as having high levels of technology skills openly admitted that there was much more that they could learn. Another reason why participants were asked to check the display and interpretation of data and offered access to results was to ensure that they were satisfied with the way they were portrayed. They could also withdraw from the study at any time or choose to remain anonymous.

The collection of data in the form of video and still photography presented difficulties concerning the privacy and protection of children. Material used in demonstrations at presentations was for a restricted audience of professional educators. It is an accepted practice that teachers and school administrators share information about the work of their students within such a closed audience. For example, all year two and twelve teachers across the state view samples of the work of children from other classes in a moderation process. However, names and identifying images of children were removed from material used for a potentially wider and more general audience such as The Learning Place project room and the data displayed in appendixes D-I. Still images had to be used for the dissertation because it is a paper report, and it was a simple process of removing identifying names and images with the editing program *Paint.*

The privacy and protection of children was clearly an issue for participants as well, and was often raised at workshop sessions. For example, there was concern over the ethics of allowing an ePortfolio to be available to a parent if it included images of other children in the class. The general response in the earlier workshop sessions was that this issue was one of many that had to be resolved when implementing ePortfolios and that collaboration with peers was an effective problem solving strategy. As participants became more involved with ePortfolios, the ethical and legal issues became a more pressing concern, to the point where it was necessary for the planning committee to include an expert in the area as a presenter in the workshop on October, 2005.

3.9 Summary

The purpose of this chapter was to plan and describe a qualitative study that investigates multiple topics across multiple sites in order to generate a new approach to professional development for technology integration. The purpose of the next chapter is to report the results of the field work of the study, which involved the implementation and evaluation of several professional development projects. These projects were engineered to create “a working environment” (Brown, 1992, p. 142) in which the theory derived from the literature review in chapter two could be applied in practical situations.

A design-based approach was considered appropriate because the study represents a unique application of several theories brought together for a specific purpose. Consequently the study reflects many attributes typical of the design-based approach (Collins, Joseph, & Bielaczyc, 2004). For example, the results of the field work discussed in chapter four demonstrate progressive refinement of a new approach to professional development for technology integration. Because this type of study is undertaken in the real world of classrooms, schools, and workshops attended by busy practitioners, activity is intense and data collection is extensive. The challenge for the study is to make meaning of the data. The study will also appear incomplete because reflection and hindsight inevitably uncover sources of information that could have been collected and analysed, and refinement does not end with the end of the study. Despite being somewhat “messy” in comparison with other approaches, the design-based approach is nevertheless useful because it allows new ideas to be tested and refined in their intended environment.

The potential strength of the design-based approach can be appreciated in Figure 3.1. “Engineering a working environment” (Brown, 1992, p. 142) allows the researcher to investigate the input variables associated with an everyday classroom, including the curriculum, classroom ethos, and the use of technology. The quality of the output in terms of the meaning that is attached to phenomena and the recommendations for other working environments will first depend on evaluating the “right things” (Brown, 1992, p. 142), and second on the quality of the evaluation. Much has been made in chapter two and chapter three of ensuring that these two evaluation processes are in order, as this is considered to be the best way to achieve the level of sophistication necessary to respond to the complex issues raised in chapter one. Figure 3.1 illustrates how an understanding of learning theory developed in chapter two contributes to the working environment, and how conclusions drawn from the experiences in the working environment will contribute to learning theory. The final relationship indicated in Figure 3.1 highlights the strength of a design-based approach in that the study tests the practical feasibility of a new approach to professional development for technology integration. Furthermore, the dissemination of the results and conclusions of the study presented in the next two chapters will have implications for future professional development projects.

Chapter 4: Results

Three research questions were investigated in this study:

1. What framework can be developed to guide the design and implementation of a constructivist learning environment to support the professional development of teachers and school administrators about ePortfolios?
2. How effective is a constructivist learning environment in supporting the professional development of teachers and school administrators about ePortfolios? and
3. Can the framework be applied in other projects to guide the design and implementation of a constructivist learning environment to support professional development?

To investigate research question one, the researcher initiated a project to support the professional learning of teachers and school administrators about the classroom implementation of ePortfolios. The researcher took the role of project leader and in consideration of the literature, developed the Professional Development Framework during the course of the project (see appendix B). A list of principles provided with the Professional Development Framework (see appendixes B.2 & B.4) and the questions that make up the framework (see appendixes B.1 & B.3) guided the development and implementation of a constructivist learning environment based on the principles proposed by Jonassen (1999) (see Table 2.1). The first part of this chapter responds to the questions that make up the Professional Development Framework to report the results of the *ePortfolio Project* from an analysis of the data in appendixes C to F. This reporting process also addresses research question two because one of the purposes of the Professional Development Framework is to evaluate the effectiveness of a constructivist learning environment developed for a professional learning project.

To investigate research question three, the framework was implemented in a project to improve the success of boys in which the researcher took the role of research manager. The second part of this chapter reports the results of the *Success for Boys Project* derived from an analysis of the data in appendix G, again by responding to the questions that make up the Professional Development Framework. The third part of this chapter reports the results of an *ICTs for Mathematics Project* in which the researcher supports the facilitator in developing a constructivist learning environment (see appendix H). Although the Professional Development Framework was not applied in this project, the reporting of this project provides further evidence of the effectiveness of a constructivist learning environment, which is a key element of the framework and the subject of research question two. The final part of this chapter is a report on the advocating by the researcher for the Professional Development Framework to be adopted by an education region of 2348 teachers in 176 schools (see appendix I).

4.1 The Professional Development Framework

The four phases of the Professional Development Framework were derived from the Learning Centred Evaluation Framework (Bain, 1999). Table 4.1 summarises actions within each phase, as well as evaluation strategies.

Table 4.1: Phases of the Professional Development Framework

Phase/Actions	Evaluation
1. Design Phase: *Investigate and plan activities*	
a. The issue and the context Describe the learning environment: the issue; the changes; the learners; engaging the learners; the context of learning; related cases; information resources; tools; and social & contextual support.	Collect information about the issue, the changes in practice, the learners, and the context guides consideration of the other elements.
b. Plan activities Plan each activity; cost; and timeline.	Propose data collection procedures to evaluate the activities, learning outcomes, and changes in practices.
2. Trial Phase: *Trial, reflect, & modify* A group of learners within the target group engage in the activities.	Evaluate the activities, learning outcomes, and changes in practices and modify the activities.
3. Implementation Phase: *Implement & reflect* All learners within the target group are engaged in the activities.	Evaluate the effectiveness and efficiency of the project.
4. Maintenance Phase: *Sustain & monitor* Sustain the project (the learning, the outcomes, and changes in practices) and generate recommendations.	Evaluate the learning, the outcomes, and the changes in practices over a period of time. Evaluate benefits to the organisation.

In the design phase of a professional development project, it is proposed that the project leader and planning committee respond to a series of questions to create a constructivist learning environment that supports learning about the particular issue. This phase has two parts. In the first part, the planners reflect on the issue, including the proposed changes in practice, the learners, and the context. From this information strategies are proposed to collate cases and encourage case based reasoning, access information resources, develop skills in using associated tools, and support learners. The second part describes the activities generated to engage learners in the manipulation space of the learning environment. Data collection procedures are proposed for the evaluation of the activities, the learning outcomes, and the changes in teaching or administrative practices.

In the trial phase of a professional development project, a group of learners engage in the planned activities. The activities are evaluated and modified in response to the analysis of collected data. In the implementation phase, all learners within the target group are engaged in the modified activities, and data are collected to evaluate the effectiveness and efficiency of the project. In the maintenance phase, the planning committee ensures that the project is sustained, even if individual participants and planning committee members withdraw. Data collection is concerned with the sustainability of the project, in particular with the continuance of the learning, the outcomes, and changes in practices even after funding is reduced or no longer available. Recommendations are generated about the project and implications for future projects.

There are two versions of the Professional Development Framework. One version is intended for the project leader, planning committee, and facilitators and one version for project participants, called the Facilitators' Action Plan and Participant Action Plan respectively. Each version has accompanying information that explains the principles and processes involved to support metacognitive reflection about the approach to learning in the project (see section 2.9.1), and to provide teachers with the information they need to teach as they are taught. While those principles and processes guided the learning in the *ePortfolio Project*, the Professional Development Framework was still under development during the project. On the other hand, the action plans and information were made available to administrators who facilitated *Success for Boys* projects in their schools and to teachers who participated in those projects. The Professional Development Framework proved to be particularly useful as a structure for reporting the results of the *ePortfolio* and the *Success for Boys* projects.

4.2 The *ePortfolio Project*

This report tells the story of a project based on the simple concept of collecting student work in a folder on a computer. Teachers quickly recognized the potential of the concept and how it could transform their work in the classroom. A number of themes will emerge in the telling of the story of this project, including: the impact of the learning context on learning; the perseverance and commitment required of individuals and teams of individuals in order to sustain a project; the human characteristics that impede or stimulate learning such as one's beliefs about how a task should be performed; the willingness of individuals to learn and to act on their learning; and the capacity of a peer group to collaborate.

The *ePortfolio Project* was initiated by the researcher in the Toowoomba and The Downs Education Districts, in Queensland, Australia in late 2003. In 2006, the study was extended to include the Education Districts of Roma and Warwick when the Darling Downs-South West Education Region came into being. The Australian Bureau of Statistics (2008) report for 2004 indicates there were 1 284 state schools in Queensland with 4 714 school administrators and 27 845 classroom teachers. In 2008, there were 176 schools in the Darling Downs-South West Education Region with 2 348 teachers and 32 308 students. Queensland is large in area with higher population densities along the coast. The Darling Downs-South West Education Region extends from Gatton to the east (100 kilometres from Brisbane) to the western Queensland border, and from Wandoan to the north to the southern border. The eastern end of the region is densely populated and includes the inland city of Toowoomba with approximately 100 000 people, Warwick (11 000), Dalby (10 000), Gatton (6 000), and Chinchilla (3 500). Because the western section of the region is sparsely populated, schools outside of rural towns tend to be further apart and smaller, including schools with one or two teachers. The context of schools in the *ePortfolio Project* have similarities in that they all belong to the one education region within the one state system, but they are also quite different. For example, schools in the inner city of Toowoomba have high indigenous populations, teachers in remote schools are unable to regularly meet with teachers in other schools, and there are high schools, primary schools, special schools, and schools that cater for students from the preparatory year to year ten and twelve.

During the period of the study, the researcher was the principal of Withcott State Primary School in the Toowoomba Education District, and had been a principal in the region for 30 years. As an experienced principal, the researcher was familiar with the context in which the participants were to implement ePortfolios and his everyday role was to support teachers. His understanding of the "physical, organizational, and cultural aspects of the environment in which the innovation [is] being implemented" (Jonassen, 1999, p. 230) was extensive and included subtleties and nuances that might not be obvious to researchers outside the system.

4.3 *ePortfolio Project* Phase 1: Investigate and Plan Activities

The information provided in this section of the report was collated early in the project, and reviewed at the end of each year in planning for the following year. The information was also used to collate submissions for funding as detailed in appendixes D.3 and D.17, and in compiling the end of year reports (see appendix D.19). The reports were forwarded to the co-ordinator and principal responsible for the Toowoomba Technology Maths Science Centre of Excellence (TTMSCE), and to the Executive Directors (Schools) and Principal Education Officers (Performance Measurement) in The Downs and Toowoomba Education Districts. A double-sided information sheet about the issue, the aims and activities of the project, and links to Education Queensland imperatives was distributed at workshop sessions and included in a CD-ROM distributed to schools in the two education districts (see appendix E.4).

A planning committee was formed by a group of interested school administrators, the co-ordinator of the TTMSCE, and the Principal Education Officers (Performance Measurement) from Toowoomba and The Downs Education Districts. The committee met at the beginning of each year to plan activities for the whole year including the dates and agenda for the workshops usually held each term. They met again three to four weeks prior to a workshop to finalise the planning of the sessions. The minutes of the meetings are recorded in appendix D. Composition of the group changed over the course of the study as individuals transferred to other regions. The planning committee was challenged by the need to encourage teachers to move from "that's a good idea" to "having a go" (appendix D.17.j.i). The other major challenge was to engage teachers in collaborating and sharing ideas using existing online processes such as the discussion list and The Learning Place (appendix D.17.j.ii).

Participants were informed at planning committee meetings and workshop sessions that the project was being reported in a study. The researcher presented sessions at the workshops on the principles and elements of a constructivist learning environment to raise participant awareness of the instructional design of their professional learning. In the list of principles that accompany the Professional Development Framework, it is proposed that a single activity may address more than one element of the learning environment, and each element of the learning environment should be addressed in more than one way. Table 4.2 is a summary of the activities implemented in the project and the corresponding elements of the constructivist learning environment developed. The activities are described in detail in appendix D, and summarized in section 4.4. Table 4.2 also includes a summary of the data collection method for each activity.

Table 4.2: Activities for Each Element of the Constructivist Learning Environment

	Activity		Element of the Constructivist Learning Environment	Evaluation
1.	Planning committee meetings	a.	Participant support facilitated by planning activities, responding to needs, and advocating for funding.	Minutes recorded (appendix D)
2.	ePortfolio frameworks	a.	Cases of ePortfolio frameworks developed by funding the release of teachers at school sites of various types and sizes; and	Survey of project managers and principals (appendix C.2)
		b.	Collaboration encouraged by requesting that the frameworks are shared as a condition of funding.	Recorded for distribution on the CD-ROM *ePortfolios: A learning tool*
3.	Workshop sessions (after school and whole day)	a.	Information resources presented and participants supported in understanding the information resources;	Survey (appendix C.1)
		b.	Cases presented and participants supported in understanding the cases;	
		c.	Skills developed in the use of relevant tools; and	
		d.	Collaboration facilitated between participants and between instructors and participants during informal and formal interactions.	
4.	Email discussion list	a.	Collaboration facilitated by participants joining an email discussion list.	Monitored and sampled by researcher
5.	ePortfolios: A learning tool (Booklet)	a.	Information resource developed as a summary of the contemporary literature on ePortfolios;	Survey (appendix C.1)
		b.	Information resource for participants to make a start and to provide a source of ideas about developing ePortfolios; and	
		c.	Skills guide in the use of tools.	
6.	ePortfolios: A learning tool (CD-ROM)	a.	Information resources and cases collated from material developed and collected during the course of the project to the date of distribution including: description of the issue; information resources; cases (written and video); skills guide; and sources of support.	Request for feedback in instructions
7.	The Learning Place Project Room	a.	Information resources, cases, and skills guide for participants to access at a time of their choosing.	Informal feedback from participants
8.	All-in-one sessions	a.	Presentations to school staff and district meetings; and	Observations and informal feedback from participants
		b.	Collaboration and support facilitated during visits to other schools.	
9.	ePortfolio playground	a.	Unstructured sessions for teachers to meet with facilitators and experts to work on their ePortfolios.	Observations and informal feedback from participants

4.3.1 The Issue

The goals of the *ePortfolio Project* were listed in general terms at the end of chapter two in consideration of the experienced cognition framework. They were:

1. To promote the classroom implementation of ePortfolios in Queensland state schools;
2. To convey to project participants an understanding of the concept of ePortfolios;
3. To provide cases of the classroom implementation of ePortfolios;
4. To support project participants in developing technology skills;
5. To provide information about the potential of ePortfolios to improve student outcomes;
6. To provide information and ideas about approaches to implementing ePortfolios;
7. To support participants as they implement ePortfolios in their classrooms and schools; and
8. To encourage participants to share their work on ePortfolios.

4.3.1.1 What is the issue?

An ePortfolio is the presentation of student achievement by linking multiple files: document; video; graphic; and sound. In developing ePortfolios, teachers would be making effective and innovative use of existing school based technology resources and expertise, and the technology skills of staff and students would improve through an authentic application of the latest technologies. Section 2.4 provides a comprehensive discussion about the classroom implementation of ePortfolios.

4.3.1.2 Why is this issue important?

The project was responding to a need for an approach to assessment and reporting appropriate for the integrated, outcomes based curriculum introduced in Queensland schools at the time of the study (appendix D.19.b.ii). This need was evident in the system imperatives that Education Queensland communicated to schools in 2003 and listed in Table 4.3 prepared by the researcher. The potential role of the *ePortfolio Project* in implementing the system imperatives is also included in Table 4.3.

Table 4.3: ePortfolios and System Imperatives

System Imperative	Contribution of the *ePortfolio Project*
1. Literacy/Numeracy	Record student activity and progress in core skill areas.
2. Implementation of Key Learning Areas (KLA)	Record student activity and progress in integrated outcomes.
3. ICTs	Utilize existing resources and build teacher and student skills.
a. Learning, teaching, and the curriculum	Integrate ICTs into curriculum areas.
b. Learning and development	Engage teachers in using ICTs as a tool for learning.
c. ICT infrastructure	Facilitate access to the latest ICTs.
d. Connectivity	Connect people, data, and information required to learn.
e. ICT support	Initiate innovative approaches for support.
f. Innovation	Encourage teacher innovation.
4. Professional Standards for Teachers	Provide flexible, innovative, and intellectually challenging learning experiences that integrate ICTs. Encourage professional networks and critical reflection on professional practice.
5. Middle Phase of Learning	
a. Focus and accountability	Provide rich, in-depth assessment information.
b. Curriculum, teaching and assessment	Promote higher level of engagement and deeper understanding.
c. Transition	Improve continuity of information exchange and pedagogy across years seven-eight, and from year nine into the Senior Phase of Learning.
6. Reporting and Assessment	Align assessment and reporting with student activity in the new curriculum framework. Reflect higher order thinking. Recognise the rich diversity of students' talents and abilities. Support the recording and collating of data from a wide range of sources for reporting purposes.

The information in Table 4.3 was included in the information sheet that was distributed to participants and also to those who had key roles in schools in the Toowoomba and The Downs Education Districts (appendix D.19). The principal of Toowoomba State High School, the largest in the district, reflects on the new learning environments encouraged by the implementation of new syllabi, and the importance of developing new reporting systems that are consistent with the intentions of those learning environments:

> While the syllabuses have been 'rolled out' in stages, there have been a number of variations arise that are now leading to conversations about the nomenclature around reporting student achievement. As part of the development of a school-wide pedagogy, staff are investigating the development of a fascinating curriculum and communicating student achievement to parents in a meaningful manner. The principal has defined a position based on consensus from Heads of Departments that the 1-10 syllabuses are the tools for planning the curriculum and that assessment should be based on the performance of the child on meaningful tasks that culminate learning episodes. While the structure of the reporting system is being developed, there is naturally significant discussion about the possibilities of conferencing and student demonstration as a meaningful reporting tool (appendix D.13.b.ii-iv).

The Principal Education Officer (Performance Measurement), Toowoomba Education District, comments on the capacity of ePortfolios to reflect higher order thinking:

> Digital portfolios, once they are skilfully adopted by teachers, would become the critical assessment tool for portraying the richness, depth and breadth of student learning in classrooms. The key purpose would be to provide students and teachers with a body of work, demonstrating achievement that allows them to reflect on their learnings to this point (distance travelled), and commence planning future learnings (learning for life) (appendix D.15.b.i-ii).

ePortfolios allow students to play an active role in constructing a record of their achievements leading to improved engagement and interest, opportunities for reflection, and a focus on a student centred approach to teaching. The principal of a large primary school supports this view when he reports interest in "providing students with a focus for independent activity and learning, and encouraging student self-evaluation" (appendix D.12.c).

Through involvement in the project, teachers and school administrators reflected on contemporary practices and opportunities were generated for school communities to engage in new conversations about technology and learning and its place in the school's curriculum, teaching, and assessment practices. The principal of Toowoomba State High School says:

> Digital portfolios will act as a point of collection for students to manage their own learning exhibitions. By selectively updating the achievement, developing skills will be showcased. They will become tools that facilitate significant conversation between the school and home. Currently, students do not take their work home for parents to view and discuss. Digital portfolios should provide significant developmental support for learning (appendix.D.13.c).

The opportunity for renewal afforded by the implementation of ePortfolios was also reflected in comments by the Principal Education Officer (Performance Measurement), Toowoomba Education District, who says ePortfolios "will become a catalyst for evaluating teaching and learning and this will lead to significant change in how classroom learning is managed" (appendix D.15.b.iii).

It was anticipated that the relationship between primary and secondary schools would be strengthened as ePortfolios were shared from year seven to eight, a key juncture in the Middle Phase of Learning. The principal of Toowoomba State High School says:

> [This school] has more than 22 feeder schools . . . Principals in these schools are addressing the need to develop a common reporting language in terms of the information carried to High School as well as common elements from Primary to High School that facilitate effective tracking of pupil development as they make the transition to secondary schooling (appendix D.13.b.vi).

The potential benefits of implementing ePortfolios for students is their closer involvement in the assessment and reporting process with improved engagement and interest and opportunities to be more reflective in their learning. The benefit of the project for teachers is that a student centred approach to learning is encouraged, and support would be provided to implement ePortfolios because of the time and skills required. The community would benefit from a visible indication that schools are using the new technologies in meaningful ways.

The outcomes of the project were to be disseminated to other schools in Queensland and beyond as a showcase of achievements in the Toowoomba and The Downs Education Districts, and the processes developed by the network would become a model for other innovative projects.

4.3.1.3 What data supports the importance of the issue?

The importance of implementing ePortfolios was communicated to participants in a variety of ways. For example, the information resource booklet *ePortfolios: A learning tool* points out that ePortfolios facilitate different ways to organise and present information of different types and origins (see appendix E.3.6.a). As well, the researcher prepared workshop handouts that demonstrated links between system imperatives and the implementation of ePortfolios. Participants readily understood the importance of implementing ePortfolios as demonstrated in the reflections by several principals and Principal Education Officers in a response to a survey (see appendixes D.12-15). However, there were no available data that established a relationship between the implementation of ePortfolios and improved student outcomes.

4.3.2 The Changes

The amount of time that a class spends on developing ePortfolios is a decision for individual teachers, and is likely to be determined by the confidence of the teacher and their vision of how associated activities will achieve desired outcomes. For example, the teacher at Crow's Nest was very confident in the use of technology and his vision and plan for ePortfolios encompassed all classroom activity (see appendix F.5.B). On the other hand, the teachers at Wilsonton were tentative in their use of technology, and while they were prepared to experiment they tended to focus on single applications (see appendix F.8). ePortfolios can be a weekly activity during visits to the computer laboratory, e.g., at Centenary Heights State High School a student reported that he worked on ePortfolios in the computer laboratory during two or three of his weekly English lessons (see appendix D.10.C.c.v). ePortfolios can also be the foundation of all activity in the classroom, e.g., at Pozieres (see appendix F.3.C.b.i). Withcott is an example of an approach to ePortfolios whereby teachers prepare a plan of learning outcomes, and in consultation with the students decide how those outcomes will be met (see appendix F.11.C.iii). Students include the plan in their ePortfolios, as well as the work they perform in carrying out activities. The teacher provides feedback on drafts and completed work by viewing each student's ePortfolio, and the ePortfolio becomes the reporting tool for sharing achievements with parents and carers.

4.3.2.1 What are the new practices?

The researcher explained to participants at the beginning of every workshop that if a teacher asks a student to write a story on a word processor and the student saves the story in a folder on the school's network, then they have created an ePortfolio. If they perform another task using technology and add it to the folder, then the ePortfolio begins to develop. If the student or teacher prepares a web page in Front Page and creates hyperlinks to the student work in the folder, then the ePortfolio has taken a further step in its stage of development (see appendix E.3.15). This activity is a practice that occurs often in classrooms and teachers may not be aware that they are developing ePortfolios. The concept of ePortfolios and the literature about ePortfolios offers ideas about how this practice can be enhanced and used as a learning tool. For example, the information booklet *ePortfolios: A learning tool* suggests how ePortfolios can be used in assessment "for" learning and assessment "of" learning, and includes ideas for planning, stages of development, suggestions about the use of hardware, and examples of work in other schools.

4.3.2.2 How are the new practices different from old practices?

The difference between the old practices and the new practices is best expressed in terms of what the new practices offer. The concept of ePortfolios represents a singular approach to the integration of technology, i.e., school administrators who implement ePortfolios in their schools immediately create a structure, or as constructivists would perceive a learning environment for all student activity. For example, the principal of Pozieres reports:

> [ePortfolios] are used to assist our students in telling their own story, an account of their work and performance that is broad, deep, and coherent, as well as being accessible both to those most immediately involved with the school and to our community. In accomplishing this, the Student Digital Portfolio also provides a strategy for a professional community's sustaining inquiry into its own work, and a continuing focus upon the critical concern of that community, that is, student learning, progress and achievement and to the daily work of a school as a learning community (appendix F.3.C.b.i).

The same applies for teachers in their classrooms, as demonstrated in the cases presented by Crows Nest (appendix F.5), Withcott (appendix F.11), and Centenary Heights (appendix F.10). Students in these schools included in their ePortfolios the stories they created in English, the experiments they recorded in Science, the drawings they produced in Art, and the activities they completed in Mathematics, along with their criteria sheets for projects, semester plans, reflections prepared by themselves and others, and feedback from teachers. Teachers and/or students can present these ePortfolios at reporting time to initiate discussions with parents and carers or as evidence of achievements. For example, a teacher from Woodcrest College made these observations:

1. The parents see their children's work from their children's perspective. It is also less confronting. They are able to join in discussions, share in students' pride of their work, and it is a focus and starting point for discussion (appendix F.2.B.b.xviii); and
2. Even though interviews are lengthy, they are very important to provide a source of communication. The student and parent share the Digital Portfolio together while the teacher can start the second phase of talking to another parent and developing their plan. This process helps to improve the parent/teacher and student/teacher relationship (appendix F.2.B.b.xix).

4.3.2.3 How do the new practices fit the context?

At the time that the study commenced in late 2003, the Queensland Government (2002) recognised that "ICTs [Information and Communications Technologies] are absolutely fundamental in this new knowledge age and for the Smart State" and that "our students must have highly trained teachers who know how to use technologies in the classroom" (p. 2). This position and the actions required of principals changed little during the five year period of the study. In consultation with the school community, principals prepare an Annual Operation Plan (AOP) and budget which details proposed school activities throughout the coming year, including learning, resource management, and professional and school development (Education Queensland, 2001b). For example, in the year 2002 principals were to "implement enhanced curriculum offerings that prepared students for living in complex, multicultural, networked societies; further integrate ICTs within teaching and learning across the curriculum; and develop distinctive approaches to schooling in response to identified needs" (Education Queensland, 2001b, p. 2). A mandatory planning document is the Equipment Replacement Schedule, which details planned replacement of ICT equipment.

The technology tools that are recommended in the *ePortfolio Project* are commonly available in Queensland schools and the skills involved are within the capacity of teachers to acquire. The administration and classroom facilities of schools are networked to provide access to a server to store data, email, and the Internet (Queensland Government, 2002). A new operating environment is being progressively introduced to schools since 2006. Teachers in those schools receive a laptop that may be used at school and taken home. The old and new operating environments have comprehensive data management systems, including student and financial management systems. Email is extensively used for communication between teachers, schools, and district and central offices, and schools are expected to maintain a web site.

In 1999, the Queensland state education authority published minimum standards for teachers in the area of learning technology (Education Queensland, 1999). Principals or their delegates were responsible for determining the attainment of teachers against a checklist of skills or standards. The skills included the ability to change a printer ribbon, understand files and directories, and conduct a basic search on the Internet, as well as items regarding classroom management, e.g., arranging student access to computers. Student centred-learning was encouraged, e.g., teachers were required to understand the learner and develop a supportive and challenging classroom environment. The items on the checklist were written in general terms and only yes/no responses were permitted.

In 2006, the researcher was trained as a facilitator for a new measurement process called the ICT Pedagogical Licence. The framework is intended to focus on pedagogy, rather than discrete technology skills. Teachers are required to: (a) collect recent evidence of lessons they had taught; (b) respond to written questions designed to promote reflection about their lessons; (c) prepare a statement of their beliefs about technology integration; and (d) request a statement from their supervisors that confirmed that what had been written was an accurate account of the teacher's work. These pieces are collated in the form of an ePortfolio and saved as a project at The Learning Place. Together, the pieces are to address each and every criterion listed in Table 4.4 (see example in appendix D.11.C).

Table 4.4: Education Queensland ICT Pedagogical Framework

1. Professional Knowledge
   a. I understand how ICT can be used to support and enhance what students learn, how they learn, and when and where their learning takes place.
2. Professional Practice
   a. I plan learning experiences within units of work that use ICT to achieve curriculum goals and are based on student developmental needs, interests, prior knowledge and experiences;
   b. I provide opportunities for students to use ICT to enhance the learning of concepts and processes, working independently and as part of a group;
   c. I provide challenging tasks that integrate learning areas and involve student ICT use throughout all stages of the learning process and for a range of purposes;
   d. I create opportunities for students to use ICT to develop and apply new knowledge, skills and understanding;
   e. I effectively manage the access to and use of ICT resources in meeting learner needs;
   f. I provide opportunities for students to purposefully use a range of communication tools in their learning; and to participate with others in ICT projects in local, national or global communities; and
   g. I plan assessment tasks that incorporate the use of ICT to meet learning goals.
3. Professional Values
   a. I set my own ICT learning goals based on regular reflection of my own professional practice and determined needs;
   b. I am committed to developing my skills, knowledge and abilities required to exploit the potential of ICT in education;
   c. I critically review and select from ICT resources and teaching and learning approaches and adapt where necessary; and
   d. I operate safely, legally and ethically when using ICT and teach and model this practice for students.
4. Professional Relationships
   a. I seek opportunities to contribute to professional teams to share what I know and do regarding ICT and pedagogy.

(Education Queensland, 2006)

Teachers are supported by attendance at a three day workshop. Those who meet all these criteria are rewarded with a certificate called the ICT Pedagogical Licence. Teachers who have attained their licence can undertake training and become moderators. A moderator views teachers' ePortfolios and allocates either a pass or fail when compared with the criteria in Table 4.4. Participation in the project is voluntary, though there is pressure from school administrators and the education authority to maximize the number of teachers who have their licence. Attainment of the licence is expected to eventually become linked to salaries.

While the licence is an improvement on the earlier assessment process, it reflects many of the negative issues that the literature warns to avoid as listed in section 2.4.16. For example, the licence requirements are becoming increasingly inflexible and pedantic to the point where teacher ownership of the process is limited. The licence is an example of *assessment of learning* rather than *assessment for learning*. Consequently, the potential of the ePortfolio to become a learning tool is being lost, and the ePortfolios reflect an objectivist approach rather than constructivist perspectives. The focus of the workshops is on the process of developing the ePortfolio for assessment, rather than on pedagogy. The content of the workshops is mandated, though the researcher includes sessions on pedagogy and his view of ePortfolios at the workshops he conducts. Teachers are critical of the process because of the amount of time involved, the high level of expectations, and the focus on assessment rather than professional development. Those who do not receive their licence are particularly vocal about these criticisms.

During the course of the study, all teachers in Queensland received training in an in-service package sponsored by the education system called Professional Standards for Teachers (Education Queensland, 2005). There are twelve standards that Queensland teachers were expected to meet:

1. structure flexible and innovative learning experiences for individuals and groups;
2. contribute to language, literacy and numeracy development;
3. construct intellectually challenging learning experiences;
4. construct relevant learning experiences that connect with the world beyond school;
5. construct inclusive and participatory learning experiences;
6. integrate information and communication technologies to enhance student learning;
7. assess and report on student learning;
8. support the social development and participation of young people;
9. create safe and supportive learning environments;
10. build relationships with the wider community;
11. contribute to professional teams; and
12. commit to professional practice (pp. 8-9).

Many of these standards relate directly to the aims of the *ePortfolio Project*. For example, the implementation of ePortfolios encourages the development of flexible, innovative, and challenging learning experiences, provides new directions for assessment and reporting, and the project should encourage teachers to contribute to their community of practice by sharing their work as cases.

Section 2.6 of the literature review describes the outcomes approach to education in the performance environment that during the study was replaced by *Learning Essentials*. The flexibility of ePortfolios was demonstrated in that these major changes in curriculum organisation required little adaptation in the implementation of ePortfolios. Table 4.3 provides a comprehensive list of ways that the implementation of ePortfolios contributes to systemic imperatives that teachers are required to implement. The implementation of ePortfolios, though, is not a systemic imperative, and individual school administrators and individual teachers have the flexibility to decide whether or not they implement ePortfolios in their schools or classrooms. Therefore, the eleven cases of ePortfolio implementation reported in appendix F are examples of school administrators and teachers recognizing that the new practices do fit the context. As previously mentioned, many school administrators and teachers are already implementing the concept of ePortfolios without formally understanding the terminology or concept. The advantage of learning about ePortfolios is that school administrators and teachers can reflect on this practice and maximize its potential.

4.3.3 The Learners

Within the broad topic of ePortfolios, participants were required to undertake a variety of tasks, involving both understanding concepts and learning skills. The researcher assumed responsibility for the whole project, for example, by recommending strategies, advocating for funds and recognition of the project within the hierarchy of Education Queensland, and managing networks and workshop sessions. However, a planning committee assisted the researcher in this role (see appendices D.5,9,16,20,25,27,30,32). Experts and expert peers who had skills in particular aspects of ePortfolios or in specific areas of technology were invited to facilitate workshop sessions and to support learners. For example, at the whole day workshop in October, 2004, two teachers from Woodcrest College and a teacher from Gatton presented their work with ePortfolios as cases, and expert teachers facilitated hands-on skills sessions in FrontPage, Movie Maker, Microsoft Producer, and PowerPoint (see appendix D.10). As participants developed skills, they were also invited to act as facilitators and encouraged to provide assistance for peers. For example, the principal of Pilton presented a session on Photo Story 3 after developing skills in this application at his school (see appendix D.26.b.iii). This dual role for participants of being both learners and facilitators is an important distinction, because as teachers and school administrators they were required to facilitate the learning of other teachers in their schools as well as pass on their understandings and skills to children. As professional educators, it was also expected that participants would take responsibility for their learning.

4.3.3.1 Who are the learners?

The learners who participated in the project are teachers and school administrators in the Toowoomba and The Downs Education Districts, including large high schools, small to large primary schools, special schools, and schools that cater for all three education sectors. Later activities associated with the project included participants from across the Darling Downs-South West Region (see appendix D.33.g), across the state (see appendix D.33.j), and students from the University of Southern Queensland (see appendix D.33.e). Appendix D.2 is a list of participants who had key roles in the project and who are named in the data set.

Participation in the project demanded considerable contribution by participants, who had to learn new skills and implement new processes. Implementing ePortfolios requires organisation, commitment, perseverance, innovation, and creativity. For example, teachers have to be familiar with technology themselves and to be able to support children in their use of technology. They have to interpret curriculum documents and systemic expectations to undertake planning that realizes the potential of technology, e.g., as discussed in section 2.4.9 concerning computer literacy and computer awareness. Teachers have to develop a personal vision of the role of technology in education (see section 1.3.4). An example of these demands on participants is evident in the learning journey described by a teacher at Withcott in her submission for the ICT Pedagogical Licence (see appendix F.D). She relates how she worked with her class to mutually develop skills, reports implications for children with special needs, demonstrates unit plans prepared to integrate ePortfolios into classroom activity, and articulates her vision for ePortfolios and technology in education. School administrators also require a well considered vision of technology in education as part of their role as leaders, as well as the capacity to support teachers who are experimenting with new approaches (see section 2.7.2). The list in appendix D.2 acknowledges the hard work and commitment of many people, and is also indicative of the number of people involved, their position, location, and contribution. The list also helps to track participants who changed positions during the course of the study. Approximately 400 other participants attended workshop sessions and contributed to the project.

4.3.3.2 What beliefs do the learners hold?

The beliefs of the participants became more apparent during the course of the project, which highlights the importance of continually updating these initial sections of the Professional Development Framework that contribute to the design of activities. Assumptions about participant beliefs were made at the beginning of the project. However, the researcher was continually surprised by the interest of the participants in the topic, their willingness to be open and to share their ideas and achievements, their passion for the role of technology in education, and the amount of work undertaken for a project that was not a systemic imperative. The latter highlights the reflective capacity of teachers as experts and professionals who have the capacity to make their own decisions about what is important in children's learning. This point is also indicative of the freedom that teachers have in deciding how the curriculum will be implemented and the support provided within schools to enable teachers to act on their beliefs.

For the purpose of discussing their beliefs, the participants are divided into four groups. There is no attempt to allocate a proportion of the participants who belong in each group, but simply to report observations.

School administrators make up the first group and they all participated as volunteers. Again, this highlights the independence of administrators in deciding what professional development is appropriate for their schools, and their beliefs about the potential of ePortfolios. Principals who arranged for the researcher to present all-in-one sessions at staff meetings also believed in the potential of ePortfolios, but were prepared to make decisions about what was good for their teachers, whether the teachers agreed or not (see appendix D.33). School administrators as a group included Deputy Principals and Heads of Departments, who were often the driving force behind projects in their schools, e.g., at Wilsonton (appendix F.8) and Clifford Park Special School (appendix F.6). Teachers were vocal about the support or lack of support of administrators, with examples observed at both extremes and at all points on the continuum. Over 50 principals from across the state demonstrated their beliefs about the potential of ePortfolios and the need for new approaches to technology integration by attending all-in-one sessions with the researcher at Withcott that included a day's travel in each direction (see appendix D.33.j).

The second group includes the school administrators and teachers who voluntarily attended the workshops and who were so passionate about the topic that they experimented with ePortfolios in their classrooms and schools and gave presentations at the workshop sessions. The beliefs of these participants are revealed through their presentations and recorded in appendix F as cases. By acting on their beliefs, these participants developed new strategies for ePortfolio implementation that go beyond the recommendations in the booklet *ePortfolios: A learning tool* because their strategies were adapted to meet specific contexts. The following example is typical of the strength of the beliefs and the perseverance of this group, as well as the messages they conveyed to other participants. The teacher begins by saying "we are supposedly the smart state and therefore I was going to use technology to work smarter" (appendix F.8.C.b.ii). She then describes a lesson in which the children had to present a news report about an animal and its life cycle with a PowerPoint presentation running behind them. Similar to the war stories of experts analysed by Orr (1996), the teacher provides only sufficient details to engage the listener:

> Now by having a video of their presentation I was therefore able to account for all of my marks that I gave them for their oral presentation and the PowerPoint, which was part of the assessment for that unit. And we've used it lots of times to show the parents. . . . So I came to the inservice that was here with [the researcher] and that was great. They told me I needed a web cam and it cost me $A60. I didn't use the school equipment and got a $A60 web cam from [a local supplier], trialled it, and it was hopeless [laughter]. It's got a little mike in it but the mike wouldn't work to pick up their voices. So we tried again. I went to [the deputy principal] and he said what I needed was to use the school mike. The child held it, tried to press the buttons and read the palm cards. Didn't work [laughter]! So then I bought this and that cost $A14, that headpiece with the voice microphone in it. It worked when [the deputy principal] came to turn the mike on [laughter]. So you've got to be willing to have a go and keep trying and trying (appendix D.8.C.b.ii).

This participant had the personal confidence to draw laughter in front of 85 peers at her apparent inability to manage the equipment. That is, she had confidence in her beliefs about how the technology should be integrated to support that particular lesson, and had confidence in her beliefs about ePortfolios developed through her learning in the workshops. Her inadequacies related to making the technology perform the tasks required and she recognized that this problem was not personally threatening as it was universally experienced by those in the audience.

The third group includes participants who voluntarily attended workshops but did not give presentations at the workshop sessions. Some of these participants applied their learning to implement ePortfolios and others did not. The beliefs of these participants could only be recorded through observations before, during, and after workshops and the workshop surveys (see appendix C.1). The fact that these participants gave up their own time to travel to and attend the workshops was indicative of their beliefs about the importance of technology integration. The engagement of these participants and their comments on the workshop survey are indicative that the beliefs of this group vary little from the beliefs of the second group described above. For example, comments demonstrate that participants generally understood the concepts and the content of the presentations and could relate these to their own context. However, the comments also reveal a continuum of preparedness of participants to act upon those beliefs from outright refusal to act, as in point number 1 below, to already taking the first steps towards implementation, as in point number 7:

1. Not likely to use this in middle (year four) classroom, too time consuming (appendix D.31.e.vi);
2. Great practical ideas (appendix D. 26.c.xv);
3. Would love to try this (appendix D. 26.e.x);
4. Useful down the track (appendix D. 26.c.xi);
5. I feel confident in tackling the program (appendix D.31.f.1);
6. I would use this tomorrow although my school has Apple machines (appendix D.31.f.12); and
7. Similar to what we plan to use (appendix D. 26.c.viii).

The fourth group includes those who compulsorily attended all-in-one sessions at their schools as arranged by their principals. These participants did not have to travel and the sessions were usually part of normal staff meetings. Two sub-groups emerged within this group. One sub-group gave similar reactions to those participants described for group three. That is, this group understood the concepts and appreciated the importance of technology integration, and some undoubtedly would go on to implement some of the ideas in one form or another. The other sub-group were openly cynical, which did not appear to be based on their acceptance or non-acceptance of the concept. Rather, the cynicism appeared to be based on the first order barriers to technology integration described by Ertmer (1999). That is, they believed the concept of ePortfolios was too time consuming to implement similar to the first comment above, and that their school's infrastructure and capacity to support them through the process was inadequate.

The distinctions between these four groups highlight the inherent difficulties in universally motivating changes in beliefs, and even if beliefs are changed, the inherent difficulties in expecting participants to universally act on those beliefs. The question to be addressed in the conclusions discussed in chapter five is whether this approach to professional development is any more effective in this regard than other approaches. At the time of the study, though, there were no other organized approaches within the districts for professional development for technology integration. Except for Education Queensland's ICT Pedagogical Licence which focuses on measuring teacher competence rather than development, no other approaches existed at the time of writing.

4.3.3.3 What skills and experiences do the learners have and need?

Most of the participants were experienced teachers, but their skills in technology varied considerably. For example, participant responses at the whole day workshop in October, 2004 drew the attention of the project planners to the need to "be aware of the age group and standard of computer skills of the group [as] many people got lost" (appendix D.10.i.vi). On the other hand, some participants were so skilled in particular applications they felt comfortable in facilitating skills sessions when asked, e.g., the skills sessions at the after-school workshop in May, 2005 were facilitated by four local teachers (appendix D.26.b). Consequently skill development sessions at the workshops were directed at two or more levels. There was capacity within applications to also cater for different skill levels. For example, an introductory session on Movie Maker created a movie clip from still photos, while an advanced session created a clip from movies. The aim of the skill development sessions at the workshops was to provide every participant with at least some new knowledge or skill regardless of their level of competency.

4.3.4 Engaging the Learners

The purpose of this section was to arouse the interest of teachers and school administrators about ePortfolios, and create a disturbance in the participants' minds about the practices they are currently applying and the potential of new practices. It was important at this stage not to overwhelm learners, but at the same time they needed to have some level of appreciation of the difficulties involved.

4.3.4.1 What is so compelling about the issue?

Two compelling aspects of the issue have already been mentioned and are the simplicity of the concept of ePortfolios and its capacity to encapsulate a singular approach to technology integration. The authenticity of working on ePortfolios is also attractive, and participants readily made the connection between what they and their students do with technology in their everyday lives and the aspirations, knowledge, and skills associated with ePortfolios. Participants would have already developed knowledge and skills in technology applications, and may have seen the project as a way of progressing their knowledge and skills. There is evidence in the following statements of this occurring:

1. Learnt about the programs. Will use back at school and at home (appendix.D.29.e.ii);
2. What a great thing to learn (appendix.D.29.e.iii); and
3. Looking forward to experimenting myself (appendix.D.29.f.iv).

4.3.4.2 How will the learner be encouraged to engage with the issue?

Two approaches were taken in the *ePortfolio Project* to engage the learners in order to respond to different contexts of the learning. In the first approach, workshop participants listened to an explanation of the concept followed by a teacher talking about their work with ePortfolios as an introductory case. As described earlier, the concept of ePortfolios is a simple one and the participants as expert teachers needed only a few minutes to have the concept explained. The more detailed presentation by the teacher impressed upon the participants the difficulties that were involved, but at the same time demonstrated what someone had achieved within a similar performance context. The information booklet prepared as a summary of the literature review of the issue was distributed at workshops. The information was used as a reference and to initiate discussion, and for participants to read when they needed more information. The information was not used to instruct the participants. The second approach was adopted for participants who did not attend workshops, or for workshop participants who wanted to review the issue. This approach involved the development of a web site for distribution on a CD-ROM. Links on the web site took the viewer to an explanation of the concept, the information booklet, and videos and written cases of implementation.

4.3.4.3 How will learner engagement be sustained?

Three purposeful strategies were undertaken to sustain participant engagement. First, activities were planned and advertised twelve months in advance so participants could plan their own involvement and be assured that the project was on-going. Second, great care was taken by the researcher and the planning committee to ensure that activities met the needs of participants and participants were satisfied with the conduct of activities. For example, the workshop surveys asked about their future needs, a well presented afternoon tea was available on arrival, and facilitators were chosen who were enthusiastic and who would generate interest and engagement. Third, the project was promoted at every opportunity, e.g., at district meetings, so that it had the appearance across the districts of an accepted approach to utilize technology and improve curriculum delivery. The participants who presented their work as cases reinforced this notion of ePortfolios being accepted within their schools as a logical progression of technology and pedagogy.

4.3.5 The Context of the Professional Development

The *ePortfolio Project* was undertaken in state schools that belong to the one education system. The project had an equal focus on the sectors within this system, including the new preparatory classes, primary, secondary, and special schools, and schools that combine these sectors.

4.3.5.1 Where will the learning take place?

Learning for those who participated in the project took place in at least five different locations. The first location included the library and three computer laboratories at the Wilsonton Campus of Toowoomba State High School. The Toowoomba Technology Maths Science Centre of Excellence (TTMSCE) was based at this school and the co-ordinator contributed funds (appendix D.3&4) and resources (appendix E.4.b.v) to the project. Whole group sessions of 90 or more participants were conducted in the library, which had a data projector and space for participants to move around during the afternoon tea and informal discussion period. The number of participants was limited by the number of computers available for the hands-on technology skill development component, which followed the whole group session. That is, 90 was the total capacity of the three laboratories of 30 networked computers each. A whole day of one hour sessions was presented at the Science and Technology Forum each year (see appendixes D.10, D.31, & D.38). This venue was the Mt Lofty Campus of Toowoomba State High School, which was similar to the Wilsonton Campus in that sessions were limited to the capacity of the computer laboratories of 30 computers each.

The second location where learning took place encompassed the numerous sites where teachers worked with children in the classroom to develop ePortfolios. Teachers have full time responsibility for a class and cannot leave their room, and need to be concerned about maintaining the flow of lessons. In this situation, teachers as learners have to anticipate what is required for the lesson, and work through problems that arise while everything else is going on in their classrooms. There will be disruptions such as behaviour issues, equipment and power failures, and situations where teachers do not have the knowledge and skills to solve a problem. They will not have time to refer to manuals or other sources of information. However, some children in these classes may have the necessary knowledge and skills to resolve an issue, or can partner children who are having difficulties, e.g., in the peer tutoring that occurred at Withcott (see appendix F.D.b.v). This process creates different dynamics, interactions, and relationships to those in a traditional classroom, e.g., as reported by children at Withcott who had created ePortfolios (see appended F.C.b).

There are many reasons why teachers would choose not to implement ePortfolios and there are times when they need to make a decision as to whether or not an electronic recording of data is preferable to paper. For example, teachers at Withcott State School used a scanner to scan running writing records, an activity that was abandoned when it was realized there were no advantages over the traditional paper format (see appendix F.11.B.a.1).

The third location where learning took place refers to teacher preparation areas and the learning that occurred as teachers prepared for lessons. Teachers may be involved in planning either alone or with team teachers or support teachers, e.g., a technology co-ordinator. They may trial a program to determine if it suits their needs and if they can master the skills involved. They may seek information, discuss their work with a colleague or expert, reflect on processes and outcomes, and review and analyse student data.

The fourth location refers to school administration areas and the learning that occurred as school administrators performed their everyday work that required the use of technology. For example, school administrators may contribute to a discussion list, send an email and submit data online to central office, write policy on a word processor, prepare a budget in an Excel spreadsheet, track resources and records with an Access data base, and retrieve information on the Internet. These activities familiarise administrators with the functions and capabilities of technology.

The fifth location refers to the participants' homes. Skills that teachers and school administrators developed in their everyday living were applicable to the skills they required for ePortfolios. The connection between school and the real world of home and work is a major benefit of implementing ePortfolios, an important consideration in developing authentic learning environments for students (see section 2.9). For example, the work that school administrators perform as described above is the same as the work that students perform in developing ePortfolios, which in turn is the same as teachers perform at home when they send an email to a friend, record holiday moments with a digital camera or video, write letters on a word processor, and set up speakers to play music on the computer. The inclusion of Photo Story 3 in the skill development sessions was an example of a program that teachers practised at home and applied at school. Teachers quickly recognised the potential of Photo Story 3 in adding interest, movement, and text to a set of photos, and practised by creating clips of their holiday snaps. Education Queensland encourages teachers to work with technology in their homes, and projects have been implemented to provide teachers with laptops and software for school and private use (see section 2.4.14 & 2.6.6).

4.3.5.2 What are the impacts of the learners' work places?

The participants who presented the 11 cases in appendix F describe aspects of their school workplaces that impact on their ability to advance their experimentation with and learning about ePortfolios. As well, one of the questions in the survey of principals and project managers asks about management issues (see appendix C.2.d). The following are some of the difficulties reported:

1. Having to be creative to make up for a lack of funding (appendix F.3.C.b.xiv);
2. Time to work on ePortfolios (appendix F.4.B.b.xi);
3. The capacity of school computer networks to cope with the speed and data storage required (appendix F.5.B.b.xxvii); and
4. Managing 25 children in a class while trying to introduce a new concept (appendix F.4.B.b.iii).

4.3.6 Related Cases

ePortfolio frameworks developed by teachers and school administrators in their schools were presented as cases at workshop sessions. Until cases were generated as a result of participation in the project, teachers and school administrators who had been working on ePortfolios outside the Toowoomba and The Downs Education Districts were invited to give presentations. This included Woodcrest State College (see appendix F.2) and Pozieres State School (see appendix F.3). A teacher at Gatton State Primary School (see appendix F.4) and a teacher at Crow's Nest State P-10 School (see appendix F.5) were early adopters of the concept of ePortfolios and developed frameworks from the beginning of the project.

Six schools received funding of $A2700 each to purchase teacher relief time and other resources to support the development and implementation of ePortfolio frameworks. The funding was only available to schools in the Toowoomba Education District. The planning committee wanted to ensure a cross section of schools was represented, including small, medium, and large primary schools, high schools, and special schools. A selection process proved to be unnecessary as nominations were received from an appropriate cross section of schools and all final submissions were approved. This group included: Clifford Park Special School; Helidon, Glenvale, and Wilsonton State Primary Schools; and Centenary Heights State High School (see appendix F.5-F.10). To comply with a participant's request to remain anonymous, one of the schools has not been included as a case. The researcher was principal at Withcott State Primary School (see appendix F.11) where a teacher and the teacher librarian developed ePortfolio frameworks. An outline of each case is provided in the following sections and appendix F has more details.

4.3.6.1 Woodcrest State College

In October, 2003 the researcher and the Principal Education Officer (Performance Measurement), Toowoomba Education District, attended a presentation by two teachers at Woodcrest State College in Brisbane who had developed ePortfolios in their classrooms. The two teachers spoke with enthusiasm about the work they had been doing with ePortfolios. At the commencement of the *ePortfolio Project*, it was important to identify teachers already working with ePortfolios until sufficient cases had been generated by project participants. Consequently, the two teachers from Woodcrest State College were invited to conduct a one hour session at the workshop organised in October, 2004 (see appendix F.2).

The two teachers worked as a team to implement ePortfolios so they could “bounce ideas” off each other and support each other to solve problems. In doing so they created their own social and contextual support mechanism that is one of the elements of a constructivist learning environment. While others around them were struggling with the equipment and a means of incorporating technology in curriculum delivery, these teachers hit upon a strong concept in ePortfolios to organise the everyday function of their classroom.

The enthusiasm of these teachers about ePortfolios and their own successes was infectious, and participants listened with a great deal of interest and admiration. The presenters were clearly able to talk to teachers as teachers, with the audience readily identifying with their quips about individual students, with their context, and with the struggle of everyday teaching. The rapport between presenters and participants was an important factor that became more apparent as the project progressed. They also left participants with a clear view of the commitment that was required if ePortfolios are to be implemented in classrooms. The Woodcrest State College teachers set the tone for future presenters.

4.3.6.2 Pozieres State Primary School
Pozieres is a small rural primary school (see appendix F.34). The principal had implemented ePortfolios in his classroom for several years before the commencement of the project, and presented a one hour session at the workshop in July, 2004. The principal believed that ePortfolios provide a richer picture of student performance than can be gained from traditional, objective forms of assessment:

1. Work in many media is accessible, portable, examinable, and widely distributable;
2. Performances are replayable and reviewable;
3. Presents a wide variety of forms of evidence that is linked for easy access;
4. Evidence can be shown to be authentic;
5. Increases skills and knowledge of multimedia production;
6. Students and teacher work together on meaningful activity rich tasks; and
7. Increases confidence of teachers in implementing technology (appendix F.3.B.f).

ePortfolios at this school are used as a learning tool and there are high expectations of students. For example, the principal recognised the critical role of reflection in ePortfolios. “The use of [ePortfolios] not only helps students make better progress on the skills in the curriculum; it also helps them develop critical skills such as reflection and self-evaluation which are fundamental to excellence in any walk of life” (appendix D.3.B.g). By articulating their thinking about each piece in their ePortfolio, the principal believes students develop awareness of themselves as learners. Students are setting goals for their future learning and are seeing patterns in their work:

> [ePortfolios] are used to assist our students in telling their own story, an account of their work and performance that is broad, deep, and coherent, as well as being accessible both to those most immediately involved with the school and to our community (appendix F.3.C.b.i).

Furthermore, ePortfolios “have become a norm in our school and are now seen as normal practice. Parents particularly like to see where their children have come from” (appendix F.3.C.b.xvi).

4.3.6.3 Gatton State Primary School
Gatton is a rural town with a primary school of 850 children, and the principal was a member of the planning committee. A teacher took responsibility for implementing ePortfolios across several classes and presented a session on his work at the workshop in October, 2004 (see appendix F.4). Several themes emerged during the presentation. First, this teacher was particularly interested in the potential of ePortfolios to engage children in their learning as reflected in these comments:

> If you really get into it and enjoy your kids doing it . . . don’t get hung up on ‘this has got to be this thing that is going to be polished and it’s got to look lovely.’ It’s got to be the kids. It’s got to reflect the kids. They’ve got to enjoy doing it. The kids should own it. If the kids own it I think that half the battle is over. It’s not something that ‘he’ wants us to do, especially if they have been given the opportunity to design their own. Try to

> work out exactly in your mind what it is you're trying to get to. Allow a lot of freedom for the kids (appendix F.4.B.b).

His strategy to promote ownership was to scaffold student development:

> At the beginning I showed them what I thought they might come up with. I also gave them this book. I think it is important that you actually scaffold for the kids. If you just come up with, 'we're going to do this digital portfolio and it's going to have this and it's going to have that.' They don't know where to go to (appendix F.4.B.b.ix).

Second, the teacher was interested in the potential of ePortfolios to improve technology skills:

> The skill levels of some of the kids were pretty low so our digital portfolio, the purpose of it, would be to increase the skills of the kids using the standard cameras, video cameras, and things like that, knowing the sites that are useful and putting on midi files, all those sorts of things (appendix F.4.B.b.iv).

Third, this teacher recognised that he came from a background of traditional teaching, while younger teachers have been brought up with this technology. "To them, they don't think these things are so wow and frightening. They're going to get in and have a go" (appendix F.4.B.b.xxi). His message was that if he could take on this new approach at this late stage in his teaching career, then it must be within the capacity of all teachers. His motivation, as expressed above, was to benefit the children.

4.3.6.4 Crow's Nest State P-10 School

Crow's Nest is a rural school catering for 430 students in primary and secondary to year ten. In an example of participant response to the simplicity of the concept of ePortfolios, a secondary teacher from Crow's Nest attended the first ePortfolio meeting (see appendix D.4) and applied his considerable technology skills to create a framework for ePortfolios in his classroom and school. He presented his work as a case at a whole day workshop in October, 2005 and the template and examples he developed were distributed to schools on the CD-ROM. This teacher envisaged the following benefits of ePortfolios:

1. inclusion of multimedia (video and audio) at the touch of a button;
2. extremely motivating for students;
3. students take greater responsibility for their own learning;
4. digital portfolios can be used at teacher interviews. Work samples at your disposal at the touch of button and therefore less juggling of paperwork;
5. students learn important IT skills and apply them for a real life purpose;
6. allows teachers to more easily track student progress over time;
7. portfolios can be burnt onto CD-ROM and transferred easily to other school[s]; and
8. increases the relevance and intellectual rigor of student learning by including work sample context and student learning reflection (appendix F.5.C.b).

He encountered and resolved issues relating to:

1. storage space (appendix F.5.B.b.xxix);
2. lacking required resources to create specific work samples, e.g., not having a scanner to scan student work (appendix F.5.C.c.ii);
3. broken links if students move their work samples or rename them after they have been hyperlinked in their portfolio (appendix F.5.C.c.iii); and
4. time restrictions (appendix F.5.C.c.iv).

The case as described in appendix F.5 is an example of what can be achieved by a teacher who has well developed skills in technology and who works intensively to develop an approach to ePortfolio implementation that seeks to encompass all aspects of the learning process. For example, through online access students would retrieve assignment tasks, submit their work, receive teacher feedback, and record their reflections, while at the same time learner choice was included to promote ownership of the process.

4.3.6.5 Clifford Park Special School

Clifford Park is a specialised setting in Toowoomba with 70 students between the ages of 12 and 19 (see appendix F.6). All students have an intellectual disability, and some students also have multiple disabilities including physical impairments. The deputy principal had a vision of implementing ePortfolios in the context of a special school. The school received $A2700 in funding from the project, and the deputy principal believed in the following advantages of ePortfolios for her setting:

1. Electronic portfolios offer us a way of collecting information regarding our students' achievements;
2. Our students generally have limited literacy skills so collecting data through traditional means such as tests and reports is not appropriate;
3. Real-life or life-like tasks are much more easily recorded using electronic equipment;
4. Smaller increments of change can be seen in video data;
5. Students can monitor their own learning by watching video excerpts;
6. Students can contribute to their own portfolios; and
7. Reporting through watching an electronic portfolio may be much more parent friendly than receiving a written report (appendix F.6.C.b).

The deputy principal made two observations about assessment, pedagogy, and goals. First, collecting data for an ePortfolio "focused strongly on what students can do, [so] there was serious reflection about what [teachers] needed to teach in the first place. Second, she asked, "how often do we prompt our students? How independent are they really? Video data showed what they could do without us" (appendix F. 6.D.b.xviii).

The deputy principal reported that many of the teachers from the school attended the project workshops and were influenced positively by the presentation of ePortfolios from other schools. She surveyed the staff to determine training needs, which was undertaken on the teachers' own classroom equipment. This was perceived to be more useful and productive than with larger groups on unfamiliar equipment (appendix F. 6.D.b.xii).

4.3.6.6 Helidon State Primary School

Helidon caters for 100 primary children in a rural area (see appendix F.7). ePortfolios were implemented across all classes at the school during the project and funding of $A2700 was received from the network. The school had an active ICT committee that focused on ePortfolio implementation, including the necessary hardware and the needs of staff and students. The covers of the ePortfolios were the same for all students, and while children had input, the ePortfolios were to have a professional look. The principal says:

> We believe that these ePortfolios are working documents and thus can be changed, additions made etc. One section of the ePortfolio is specifically designed by the students themselves. The second section is maintained and organised by the students (links to projects, assignments etc.) while the third and final section is organised by the staff with assistance from the students, e.g., achievements, academic results, examples of work, and reading progress (appendix F.7.B.c.i).

The principal reports that at least 80% of the teachers had excellent skills in technology. The school would soon have the appropriate equipment but needed the support of the funding to provide extra staff for the development of ePortfolios. During her presentation at the workshop in May, 2005, the principal added the following comments:

> It has been a really big learning curve for us. We had a planning stage and worked out what we wanted to do, but while we are actually doing it we are making changes all the time. It certainly has helped that we are a small school and we've got the entire staff doing this and behind getting things done. So the children are doing very, very well (appendix F.7.C.b.i).

4.3.6.7 Wilsonton State Primary School

Wilsonton caters for 800 primary children in the city of Toowoomba (see appendix F.8). The implementation of ePortfolios at Wilsonton was co-ordinated by the deputy principal, and the three teachers involved in the workshop presentation in May, 2005 spoke highly of his personal support of their endeavours. The school received $A2700 in funding and wanted to "follow the developmental examples gleaned from other schools" and develop ePortfolios that contained "examples of work and performances across the year and transferred to DVD for sharing" (appendix F.8.B.c).

Each of the teachers involved in the presentation had developed ePortfolios in different directions and looking at different aspects. One teacher was using Movie Maker with children for assessment purposes, another was investigating how ePortfolios could record the achievements of students with special needs, and another was in the early stages of creating PowerPoint presentations with children. At the time of the presentation the school was investigating possibilities and planning whole school implementation of ePortfolios the following year. One of their main problems was the age and slowness of their computers, and providing enough time on computers for a class of 25 children to complete tasks. Of particular note was the application of ePortfolios in classes of young children, as one teacher reports:

> I've found it a really useful tool because the traditional learning activities and assessment tasks that year ones do were a little bit out of their range of ability. So it was useful for me to be able to actually digitally record it and then write it and talk about what they've said as well as coming up with the standard referents as to why I've given them the mark. I did a template and then once I'd done the template I was able then to put in each child's photo and their work so I could have a whole class of students with the same (appendix F.8.C.b.iv).

4.3.6.8 Glenvale State Primary School

Glenvale caters for 550 primary students in the city of Toowoomba (see appendix F.9). A teacher experimented with ePortfolios with her year one class in 2004. She was appointed to the part-time role of technology co-ordinator in 2005 and enlisted the support of an active Technology Committee to promote the implementation of ePortfolios. The school received $A2700 in funding and gave presentations at a meeting of early childhood teachers in February, 2005, and at the workshop in March, 2005. It was envisaged that ePortfolios would:

1. Provide an excellent platform to achieve many of [the school's] visions;
2. Provide a purpose for teachers to update their personal computer skills and encourage them to integrate ICT more and more into their planning;
3. Provide students with opportunities for skill enhancement, incentives for work application, and opportunities to reflect on their learning and achievements; and
4. Provide parents, particularly those with limited access to school, and the community with a greater insight into the education of their children (appendix F.9.D.c.v).

The teacher reported difficulties with the capacity of the school's network to cater for their needs. However, she was successful in encouraging 20 teachers to volunteer for professional development and conducted workshops for teacher aides (appendix F.9.C.a.ii). Several examples of ePortfolios developed at this school are illustrated in Figures F.2-F.6.

4.3.6.9 Centenary Heights State High School

Centenary Heights State High School caters for 1000 students from year eight to year twelve in the city of Toowoomba (see appendix F.10). The implementation of ePortfolios was co-ordinated by a Head of Department, and the school received $A2700 in funding. The design and application of ePortfolios was to:

1. Target the year eight transition class where collaborative and co-operative curriculum design and delivery will enable e-folios to be established and applied in comprehensive and practical contexts;
2. Develop holistic student profiles with personal and academic aspects, ultimately providing facility for data recording and progress monitoring. Student driven and teacher entry sections; and
3. Establish structures and processes for the eventual electronic transfer of e-folios from primary to secondary schools to facilitate further constructivist learning opportunities and approaches based on student needs and achievement, and efficient and expedient inter-school sharing of critical relevant data and information (appendix F.10.B.c).

In December, 2005 a teacher invited parents, friends, and staff to an open lesson to view the ePortfolios developed by her year eight class. This excerpt is from a notice in the school newsletter about the open lesson:

> A growing trend around the world is to replace the plastic display folder with an electronic presentation. . . . We are interested in using the ePortfolio idea for assembling a collection of student's assignments and assessment pieces to demonstrate the level of achievement that a student has reached in a particular year. Such a CD-ROM collection could be shown to parents so they can see the standard of work completed by their child. It would enable parents to become more involved with a student's total school experience. The idea also leads naturally on to the concept of presenting an ePortfolio resume on a CD-ROM to a prospective employer. Such a collection can feature samples of work (as a display folder would) and also demonstrate technical skills in preparing this work and using certain software. This year we have used [class number] as the trial class and they have enjoyed the experience of using Dream-Weaver and frames to build their presentations (appendix F.10.C.b.i).

During the lesson, the students worked on their ePortfolios in the computer lab while one student at a time demonstrated their ePortfolio on a computer at the front of the room using a data projector (see appendix F.10.C.c). The students were open and comfortable in talking about their work. There was evidence during the session of peer collaboration and support as students either talked quietly to their neighbours or offered suggestions to the student at the front when aspects of their ePortfolio did not function. There appeared to be issues with hyperlinking files that needed to be resolved.

As recorded in appendix F.10.C.c.v, a student reported that he worked on his ePortfolio during two to three of his weekly English lessons. The teacher would provide direction on a required task and students could work on their own with support over the following few weeks to complete the task. The ePortfolios did not include self, peer, or teacher reflections or goals, but the student thought this would be a good idea. No record was kept of drafts, with students responding to teacher feedback until drafts became completed pieces of work. This student considered himself "not much of an ICT person" and that his ePortfolio did not include as much material as other students. He would like to include videos, particularly of sport and music. He would like to build on his ePortfolio in year nine, storing some completed items and taking a copy home each year. As a Manual Arts student, he was able to save to his ePortfolio those drawings he had created in Graphics using Pro Desktop. He recognised that he was using the same tools as professionals in the building industry, and enjoyed following a project through from the design phase to the completed article. In Studies of Society and Environment (SOSE) he had prepared a project in FrontPage on the Moore River Settlement as a study of the history of Australian Aborigines. He created a PowerPoint presentation for a theory project in Physical Education. In Science, he copied written notes from practical work into a Word document for inclusion in his ePortfolio (appendix F.10.C.c).

4.3.6.10 Withcott State Primary School

Withcott caters for 280 primary children in a rural area not far from Toowoomba. The researcher was principal at Withcott throughout the study, and he wanted to support teachers at Withcott and elsewhere to meet the grassroots interest in ePortfolios. He envisaged ePortfolios as a logical progression in the classroom integration of technology and was "keen to move beyond the obvious and look at how we can make a real difference in teaching and learning" (appendix F.11.B.c).

Throughout 2004, the principal and teacher librarian developed two types of ePortfolios to record the progress of children in year one. In the first, FrontPage was used to collate a series of three video recordings of the year one children reading in March, May, and November, and included the child's picture, reading record, checklist of the first hundred words, and a handwriting sample (see Figure F.7). The work involved was too extensive to sustain, and consequently a PowerPoint ePortfolio was created which included just the videos (see Figure F.8). In 2005, the teacher librarian, who now had a full time class, worked with a teaching partner and designed a structure for ePortfolios to guide the children in their collections (see Figure F.10).

In September, 2005 these two teachers surveyed their students about their work on ePortfolios, and received the following comments:

1. I like doing them because then I don't work in a textbook. It's good because we learn new skills. It's all my creation and ideas. You use your imagination on how it looks;
2. Know what you did at school when older. I learnt how to use PowerPoint. I learn how to hyperlink, use clips, design and organise;
3. They're quick to get into and you can get all your information about it. You learn things that you can do at home. You can find each folder easily. You can give your own opinion. You can learn how to do hyperlink. You can keep track of time. No one can teach you what to do. You can learn new things. It's your own private diary. It lets you put our own pictures on it. It is helpful in getting jobs. You can write personal things on it. You design your own things;
4. So kids learn to show teachers, adults etc. Help to remember;
5. To know how to work PowerPoint. Custom animation. The Title. To draw the textbox. Changing background. Clip art. Basic shapes;
6. Giving our own opinion by typing rather than speaking. We learn how to type freely and more easily;
7. It's better than looking through a pile of paper just to find a bit of information about things. It's a great way to write things and make it look pretty;
8. It's good to help other people and it's really fun to do;
9. We get to say our opinion. It's like your own diary. It gives you a choice. You get to design the pages yourself;
10. Get to do it your way and use bright colours;
11. To help us learn some of the computer skills for high school;
12. It's work and having fun at the same time. It'll be cool to look back on. I can compare my results over the years;
13. Looking back and seeing what you have done;
14. It's useful for showing our parents and other people what we have learnt; and
15. People can help you if you're stuck (appendix F.11.C.b).

4.3.6.11 How will learners access similar cases?

Participants attended presentations of the cases above at workshops. Video recordings and notes on the cases could be accessed through The Learning Place project room, as well as from the CD-ROM *ePortfolios: A learning tool* distributed to all schools in the two education districts. Participants who attended the workshops could see and hear the presentations by their peers and ask questions, and they could also review the videos and notes.

4.3.6.12 How will learners be encouraged to use Case-Based Reasoning?

The researcher introduced each workshop session and among other things, outlined how the ePortfolio network was developing cases. At the same time, he made participants aware of the principles of case based reasoning and discussed the steps of "retrieve, reuse, revise, and retain" supported by a PowerPoint presentation. He used an example of a student project concerning the issue of dwindling town water supplies to demonstrate case-based reasoning. That is, students would develop a water supply solution for the city of Toowoomba by applying what they knew already, what they had learned from the information resources, and what they had seen in cases of other cities solving the issues that they found on the Internet or in the library. The same process of explaining the case-based reasoning cycle also took place in the all-in-one sessions.

4.3.6.13 How will the new cases be recorded, stored, and accessed?

The Gatton, Woodcrest, and Wilsonton presentations were video taped with permission, while presenters from Withcott, Pozieres, Clifford Park, and Glenvale provided copies of their notes and PowerPoint presentations. Information from these presentations, including the ePortfolios created by children, was redrafted in the form of a written case. The cases contributed to the data set in appendix F, and as previously mentioned, made available through The Learning Place project room and the CD-ROM *ePortfolios: A learning tool*. The transposing of electronic data into a written format enabled the privacy of children to be protected, which may have been compromised if actual ePortfolios were used as exemplars. The *print screen* facility was used to record images of pages of ePortfolios. The images were opened in Microsoft Paint and faces and other identifying elements were removed using the *duster* and *fill* options. The images could then be safely included in the cases, along with a description if necessary of the original pages.

4.3.7 Information Resources

Working with ePortfolios is a developmental process, and it was considered important that teachers and school administrators were made aware of possibilities that had not been considered. That is, information resources could be used in the initial stages of a school based ePortfolio project and then used later to reflect on what had been achieved and what would be possible to achieve. Information about "views of knowledge" and "learning theory" was included for two reasons. Participants would be aware of processes so they could teach as they were taught, and participants would have background knowledge on which to base their metacognitive reflections (see section 2.9.1).

4.3.7.1 What information will learners need?

Six sources of information were collated that were considered to best meet the needs of participants. First, the researcher collated a list of web sites that would be of interest to a participant in accessing information via the Internet about ePortfolios and examples of ePortfolios (see appendix E.1). Participants were encouraged to add to the list of web sites, but few contributions were received. Second, the researcher compiled a list of 14 questions that participants might use as a resource and refer to in developing ePortfolios in their classrooms. The questions were derived from the literature review to stimulate thinking about ePortfolios and the issues that need to be addressed, and are listed in section 2.4.17 and appendix E.2.

Third, the researcher compiled a summary of the literature review on ePortfolios (see appendix E.3). The title of the summary, *ePortfolios: A learning tool* was intended to emphasize student centred formative ePortfolios implemented to support student learning rather than teacher centred summative ePortfolios (see section 2.4.5). The latter have a role, but teachers who adopt this type of ePortfolio are missing out on the potential of ePortfolios to contribute to valuable student learning experiences. The booklet contained the following topics:

1. definition of ePortfolios;
2. concepts of *views of knowledge* and *theories of learning* and how these relate to changes in teaching practices as a consequence of implementing ePortfolios in a classroom;
3. types of ePortfolios and their purposes;
4. ePortfolios as an assessment tool;
5. ePortfolios and other education initiatives or concepts, e.g., information literacy and multiple intelligences;
6. software and hardware and how they are used;
7. content of ePortfolios;
8. stages of development of ePortfolios;
9. evaluation of ePortfolios;
10. issues to be resolved; and
11. questions for preparing a plan of action.

The booklet was distributed and discussed at the workshop in March, 2005, and the following comments were recorded by participants on the evaluation survey:

1. Comprehensive resource. Great;
2. Very easy to follow;
3. Very helpful. Clear explanations. Clears up some of the 'mumbo jumbo.' Very helpful comments and insights by the presenter. A useful session even for the beginner;
4. Need more time to look back at and use booklet. Great for resource; and
5. Will look at it properly (appendix D.24.d).

Fourth, information resources were developed by presenters at the workshop sessions. Local teachers and school administrators were generous in the time they provided to develop these resources. For example, a music teacher who services several schools in the Toowoomba Education District had particular skills in audio equipment and software. As an experienced musician familiar with the requirements of both public performances and classroom teaching, he was skilled in audio editing, converting files, and other associated tasks. Audio files are a useful tool in ePortfolios, and have advantages over video and image files. They are easy to manage, record, and play, and use little space. Modern computers have built in microphones and speakers, so the basic equipment is always on hand. The teacher created a resource for learners, and presented several sessions on how the resource may be used (see appendix D.29.b.iii).

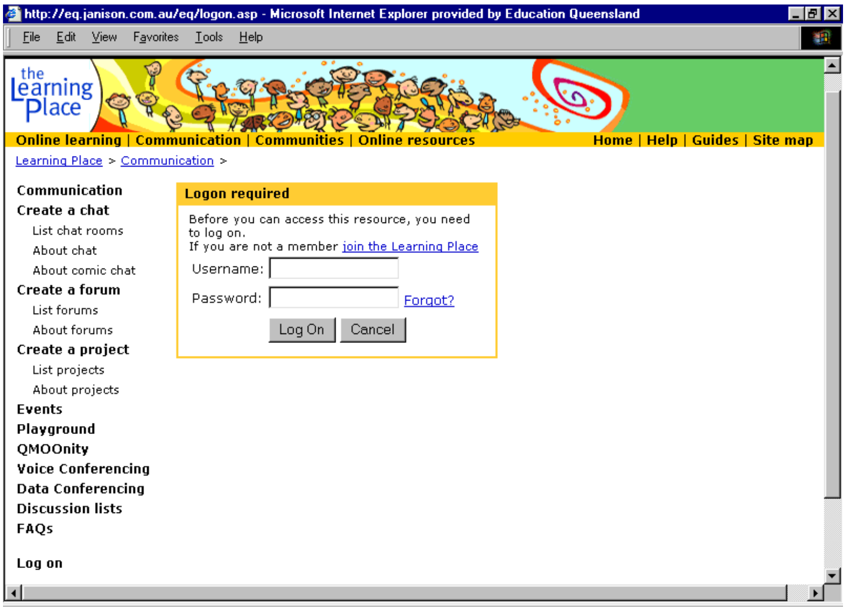
Fifth, the TTMSCE had previously collected guides on using technology and developed a resource called *Integrating ICTs* through another project, and allowed these to be made available for participants. The guides included: Burning CDs; Copyright; Creating a Multimedia Presentation in Producer; Hyperlinks; Introduction to FrontPage; Microsoft Photo Story; and PDFs.

Sixth, the teacher from Crow's Nest mentioned in section 4.3.6.4 collated a CD-ROM called *ePortfolio Resources* that he had collected and developed himself, and also allowed this material to be made available to participants. Seventh, a summary of the activities of the ePortfolio Alliance was regularly updated, and contained relevant information such as the relationship between ePortfolios and systemic imperatives (see appendix D.18).

4.3.7.2 How will learners access information?

The information resources were distributed on paper at workshop sessions, and collated on the CD-ROM titled *ePortfolios: A learning tool* (see appendix E.4) and posted to all schools in the Toowoomba and The Downs Education Districts. The researcher was contacted by individuals requesting a copy of the CD-ROM to be forwarded (see appendix E.4.c). The information was also uploaded to The Learning Place Project Room established for the project. The Learning Place is a web site managed by Education Queensland, and is available free for Education Queensland employees. Access requires a username and password, and the figure below depicts the home page.

Figure 4.1: The Learning Place Home Page



The site facilitates access to four areas. First, the learning management system, Blackboard 5™, is used to facilitate online learning. Students and staff can learn at a place, time and pace of their choosing in a range of established courses or from a course they have developed themselves. Second, The Learning Place offers online communication tools so that teachers can communicate online with peers and students in a safe environment, including both synchronous (same time) and asynchronous forums (threaded discussions). A project room provides space for long-term projects. Third, The Learning Place offers community places where teachers and school administrators can access professional learning opportunities to suit their needs and location or develop their own professional community. Fourth, The Learning Place provides access to online resources including: the Curriculum Exchange; the Professional Exchange; the Professional Learning Online Tool (PLOT); and the E-Lesson Planner to help teachers develop lesson plans.

4.3.7.3 What support will learners need to understand the information?

Support for the learners in understanding the information was provided at workshop sessions. For example, the researcher would "walk" participants through sections of the booklet *ePortfolios: A learning tool* to explain concepts. Other presenters would hand out information to support their presentation.

4.3.8 Tools

Participants in all of the projects in this study were informed that there are three types of tools in a constructivist learning environment, namely: physical; thinking; and communication tools. The researcher considered that the terms used by Jonassen (1999) of cognitive (knowledge-construction) tools, static and dynamic knowledge modelling tools, and conversation and collaboration tools, were too difficult for teachers who were already grappling with many new concepts. Whether these alternate terms adequately describe Jonassen's intentions is debateable. However, in the context of the projects they proved to be readily understood and accepted.

Physical tools, as the term suggests, are tools that exist and have a physical presence, for example, digital cameras and electronic microscopes. As these tools were always on display at workshops, participants knew precisely what was meant. Physical tools also included software such as Microsoft Word, which perhaps was not quite as readily associated as a physical tool. However, software can be said to physically exist on a computer and is usually loaded via a DVD which also physically exists. The term physical is useful in that it does not make distinctions between ICTs and other technologies. For example, a hammer or an electric drill in a Manual Arts Department is a physical tool that requires the same skill development for both teachers and students as a word processor. These tools also require an understanding of how they are used by the community of expert practitioners, i.e., carpenters, as proposed by the concept of cognitive apprenticeship explained by Brown et al. (1989) in section 2.12.1.

As described in the following sections, thinking tools include any technology that we use to support our thinking and planning, and communication tools include any technology that we use to communicate with others.

4.3.8.1 What physical tools will learners use?

Teachers need to take advantage of the latest software and hardware to successfully implement ePortfolios in the classroom. *Plug and play* hardware is popular because of its ease of use, and students should be exposed to the latest equipment in preparation for their future roles in the workforce. Teachers and students enjoyed using the new hardware for entertainment and everyday living, e.g., preparing a movie clip using Photo Story 3 of their holiday photos taken with a digital camera. Teachers have to support students in using technology to develop their ePortfolios, as well as manage files, folders, access, and storage. Hardware and software issues need to be resolved, and teachers need to be aware of which piece of equipment or software is appropriate for a particular task. They may also need to perform certain tasks for students until the students can perform the task independently.

School administrators need to be aware of the latest developments in software and hardware in order to understand the potential of an investment in school resources and to support teachers. For example, they need to budget for new resources, technical support, maintenance, and equipment replacement, as well as direct teachers towards resources that are more effective for a particular task. It may only be through demonstration and hands-on practice that the suitability of resources becomes apparent. For example, a digital video camera delivers a high quality video, but editing is time consuming and video clips have large files sizes, which causes storage issues. A web cam or digital camera is easier to use and files are easier to manage, and may provide a more effective outcome. Table 4.5 lists the hardware that was commonly used in the development of ePortfolios during the project.

Table 4.5: Hardware

	Hardware	Applications
1.	Computers	Manage hardware and software. Manage folders and files to develop, access, and storage of ePortfolios.
2.	Networks	Access ePortfolios from any computer on the network. Storage of ePortfolios.
3.	CD/DVD burners	Import material into an ePortfolio. Storage of projects and ePortfolios.
4.	Memory devices	Storage of projects and ePortfolios. Transfer files between computers, e.g., school to home to school.
5.	Printers (laser & ink jet)	Print student and teacher work for sharing, display, or storage.
6.	Scanners	Convert paper images to digital images. Import text from a paper document to a word processor.
7.	Digital cameras	Record student activity. For student projects.
8.	Digital video cameras	Record student activity. For student projects.
9.	Web cams	Record student activity. For student projects.
10.	Data projectors	Display student and teacher work. Support classroom communication.

Education Queensland has an agreement with Microsoft that involves an annual fee paid by schools (see section 2.4.14). The Microsoft Office suite of products may be used in classrooms and administration, and employees may load and use the software at home. This agreement has standardised software in all state schools in Queensland, which simplifies the task of enhancing the skills of teachers. Commands and the layout of programs are uniform, so that skills developed in one program will apply in other programs. For example, the edit function in Word is similar to the edit function in another Microsoft program such as Excel. Furthermore, the function is similar in non-Microsoft programs such as Adobe Acrobat PDF Maker. Information is easily transferred between applications. For example, a project can be prepared in Word, copied into PowerPoint to create a presentation, or converted to a web page in FrontPage.

Besides Microsoft products, other software to support the development of ePortfolios may be licensed for single or multiple use on a network, or may be available free as a download from the Internet. For example, IrfanView is a simple free program that is useful in renaming, resizing, and cropping images. Table 4.6 lists the software that was commonly used in the development of ePortfolios during the project.

Table 4.6: Software

	Software	Applications
1.	Word	Word processing.
2.	PowerPoint	Framework for ePortfolios. Presentation of student projects.
3.	Outlook	Email between individual and groups of students, teachers, administrators, facilitators, and expert support.
4.	Access	Database of student achievement. Database for student and teacher projects.
5.	Excel	Spreadsheet of student achievement. Spreadsheet for student and teacher projects.
6.	Movie Maker	Video clips for projects.
7.	Producer	Produce multimedia presentations.
8.	IrfanView	Rename a batch of images for file management. Resize a batch of images to conserve disk space. Edit a still photo.
9.	Audacity	Create audio clips for projects.
10.	Photo Story 3	Create video clips from still photos.
11.	Adobe Acrobat Reader and Writer	Read documents in PDF. Convert documents to PDF to conserve space for email and web upload and for security, e.g., report cards.

12.	Inspiration	Plan a whole ePortfolio. Plan a project within an ePortfolio.

4.3.8.2 How will learners develop skills in these tools?
Activities described in section 4.4.2 were directed at developing participant skills in the use of tools, and included demonstrations of software and hardware, skills sessions at workshops, providing participants with access to guides, and the ePortfolio playground where participants could practise skills with peer and expert support. Presentations and skill development sessions at workshops continuously linked the skills that participants needed in the classroom with the skills that are used in our everyday lives. For example, taking a video on holidays and editing that video is a skill that teachers may use with students. As discussed in section 4.3.5.1, skills will be developed though use, and that includes use in the home, teaching preparation areas, and during teaching.

4.3.8.3 What thinking tools will learners use?
An important thinking tool in the context of developing ePortfolios was the software *Inspiration.* This software is easy to use and supports the planning of ePortfolios as demonstrated in Figure F.10. The software creates *drop and drag* graphic text boxes that contain information, and links are inserted to show relationships between the boxes. The appearance of the graphic text boxes can be varied, and notes added to the links to provide more information about the relationship. The program is compatible with Microsoft Word, and is also useful in planning projects within an ePortfolio. The usefulness of this software is enhanced when it is used in the classroom in conjunction with a data projector. The teacher or a student may enter ideas and plans generated by group brainstorming. A cordless keyboard and mouse may be passed from student to student to allow flexibility in data entry.

Another thinking tool was the five elements of a constructivist learning environment. The elements were discussed at presentations by the researcher at workshops, and it was explained how the elements were applied in the *ePortfolio Project*, and how they could be readily applied to a classroom learning project. As well, lists of questions were collated and distributed at workshops and included in the booklet and CD-ROM *ePortfolios: A learning tool*. The lists were designed to stimulate reflection and to aid in planning (see appendix E.2).

4.3.8.4 How will learners develop skills in these tools?
As with the physical tools, activities described in section 4.4.2 were directed at developing participant skills in the use of thinking tools.

4.3.8.5 What communication tools will learners use?
Email and email discussion lists were the principal tools used by learners to communicate and collaborate with each other and facilitators. All Education Queensland employees are provided with an email address and can access an email service at their workplace and at home if they have an Internet connection. Email is commonly used as a means of communication within the organisation.

Education Queensland provides a subscription service for employees to establish email discussion lists. For example, as a principal, the researcher has access to the school administrators' email discussion list in the Toowoomba Education District. This list is used to share policy developments, arrange meetings, comment on events, as well as to connect with each other on a personal level. School administrators conduct a considerable proportion of their everyday business via email, and participation in a discussion list is an extension of those tasks. It is the researcher's experience that school administrators are difficult to contact by telephone as they are in and out of their offices during the day, and are easier to contact by email with a good level of response. An email also provides a record of a contact that may serve as a reminder for a response at a later time. The following excerpts indicate the content of discussions. The first excerpt was posted by a facilitator to generate discussion:

1. Yesterday you mentioned that you had the opportunity to view the *Kahootz* software. I understand it may be available from the Aust Children's Television Foundation. Can you please let me have more information on this?

2. Can anyone point me in the direction of a guide to using *FrontPage* that can be followed by students at a year four/five level (and preferably, at a year three level)?
3. ICT Co-ordinator to researcher: Could I please have a copy of some of your ePortfolio examples to show my computer committee? I've been thinking about how I'm going to use some of those [teacher relief] days and I think I'll get teachers off in year level blocks (say morning, middle, and afternoon session) and we'll initially look at tools (scanners, cameras, and web cams), or using PowerPoint and hyperlinks etc. Year levels will have to get together and decide what tools and software they want to explore, before the session so I can have things ready for them. Sound like a good idea?
4. Participant to researcher: Last year I attended one of your sessions on ePortfolios. We now have folders on our server and are ready to begin! I thought there was a template on the disk you gave out, but I can't find one . . . does such a thing exist and would you share it?
5. Trying to see if there would be any interest in the district re: advanced 'Flash' training especially 'action scripting;'
6. Participant to Principal Education Officer (Performance Measurement): Just letting you know in regards to ePortfolios and integrating ICTs that [our school] is using ePortfolios for all students this year. I have already run one inservice on them for surrounding small schools in the cluster but would be happy to help out any other small schools with questions that are nearer to me than the Toowoomba alliance near me.
7. Thought [this] might be of interest to some. I couldn't say it more plainly myself (Electronic Portfolios for Whom? EDUCAUSE Quarterly February 8, 2006). 'The literature doesn't discuss ePortfolio use to meet student needs and concerns but to support administrative efforts to solve long-term curricular issues.' And I agree with this assessment: 'Implementers who have not thoughtfully addressed the key issues outlined here will eventually come crashing down.' The author writes that there is hope - but how much damage will the institution-centered initiatives cause in the meantime? and
8. Saw this mentioned in an article on using digital portfolios. 'At the end of their last primary year, the students presented their ePortfolio individually to their teachers for the first year of secondary school as part of their transition program' (appendix D.22).

It would be reasonable to assume that the effectiveness of discussion lists would be reduced if participants do not regularly read or contribute to the flow of emails. However, a growing number of schools have been observed to use email as a key means of communication between teachers and between teachers and administrators. Participants were encouraged to use email and email discussion lists, e.g., information about workshop sessions and other coming events was communicated via email, but the use of this tool ultimately rested with individuals. The Learning Place supports discussion forums in the project rooms that teachers can create for student use in their classrooms. Both synchronous (same time) and asynchronous (threaded discussion) forums are available.

4.3.8.6 How will learners develop skills in these tools?

It was assumed that participants would develop their skills in the use of most communication tools during the course of their everyday work. The Learning Place mentors trained by Education Queensland facilitated sessions at workshops and visited schools to provide more personalised support.

4.3.9 Social and Contextual Support

In this section, project planners consider those factors that impact on the implementation of the project.

4.3.9.1 What factors will impact on implementation?
Workplace factors that participants perceived would impact on their capacity to implement their learning were identified in their comments in surveys:

1. time to learn technology and to work on ePortfolios with children;
2. classroom management issues;
3. the capacity of school hardware in terms of connection speed and data storage;
4. access to technology, e.g., secondary English teachers who only have access to computer laboratories for a couple of periods each week; and
5. funding of additional technology, e.g., web cams and video cameras.

The intention of the funds provided by the project was to alleviate the impact of some of these factors. Schools have access to other funds to support projects such as this one, e.g., the ICT Grant, and have the capacity to generate other responses, e.g., implement a program whereby students purchase laptops. While the project funds were useful and schools could inject other funds to support implementation, the focus of the project was to make the best use of existing resources, and any additional resources that were purchased would be aligned with the on-going enhancement of a school's ICT program. Successful implementation, therefore, is dependent on the ability of teachers and school administrators to solve the problems relating to their particular context.

4.3.9.2 What support will learners need?
The instructional design of the project and the activities generated by the project provided a wide range of learning opportunities for participants. However, it was anticipated that participants would need support in the following areas when they attempted to apply their learning by implementing ePortfolios in their classroom:

1. solving immediate software and hardware issues;
2. managing the classroom during the period of experimentation;
3. balancing time, resources, and ambition to avoid being overwhelmed; and
4. having the courage to make the first step, i.e., moving from 'that's a good idea' to enacting the concept.

As suggested above, some of these areas of perceived need could be addressed by funding, e.g., to release teachers from their classroom duties in order to set up templates and learn how to use the technology. Otherwise participants could access the stored knowledge associated with the project as described in Figure 2.1, which included cases and information resources, and they could contact fellow participants, facilitators, or other experts for encouragement of specific solutions to their issues.

4.3.9.3 Who will provide learner support?
The researcher provided his email address on all correspondence and information distributed to participants. He frequently responded to requests for support from individual teachers, and visited schools to provide support as requested by school administrators. Besides the support provided during workshops, participants conversed in the period before and after workshops to access mutual support. As a network of learners, there were opportunities for participants to contact other participants and facilitators and seek support.

4.3.10 Activity Planning
Table 4.2 provides a list of the activities in the *ePortfolio Project* along with the associated data collection processes, and section 4.4 discusses the activities in detail. This section will therefore focus on the planning committee which met regularly to manage the project. The planning committee was made up of the researcher and other school administrators, the Principal Education Officers (Performance Measurement) from Toowoomba and The Downs Education Districts, and the co-ordinator and principal responsible for the TTMSCE, which contributed funds, expertise, and venues. The following actions were addressed by the committee:

1. advocate for funds (appendix D.5.b.xii);
2. allocate funds (appendix D.20.b);
3. arrange the discussion list (appendix D.5.b.vii);
4. promote the network at principals' meetings (appendix D.5.b.ix);
5. make contact with other learning networks (appendix D.5.b.vi);

6. advertise events (appendix D.5.b.xiii);
7. plan activities (appendix D.20.b.v);
8. contact potential presenters (appendix D.5.b.v);
9. co-ordinate with The Learning Place mentors (appendix D.5.b.iii);
10. consider feedback on activities (appendix D.16.b.i); and
11. decide the role and name of the network (appendix D.16.b.iv).

One of the meetings was held online via a synchronous discussion forum on The Learning Place for the convenience of members who would otherwise have to leave their work places and travel. Appendix D.9.b is an excerpt of the meeting, and demonstrates a number of factors:

1. A principal had to leave the discussion to deal with a situation, which demonstrates the difficulty of trying to participate in professional development while the everyday reality of working in schools continues to happen in the background (appendix D.9.b.i);
2. The consideration given to meeting the needs of presenters and participants, e.g., having a presenter work at a round table so that participants could contribute to the presentation (appendix D.9.b.xiv);
3. The identification of presenters who had developed expertise in particular areas (appendix D.9.b.xiv); and
4. The difficulties of online synchronous discussion being somewhat disjointed because of the delay between typing and sending a contribution, and the slowness of the connection (appendix D.9).

In summary, the planning committee contributed ideas that the researcher could not have generated on his own, and performed tasks that would have otherwise fallen to the researcher. The committee also provided a test bed for ideas before they were enacted. The involvement of key people at this planning level of the project contributed to the promotion of the project in schools and at higher levels of the education organisation where decisions were made about funding and support.

4.4 *ePortfolio Project* Phase 2: Trial, Reflect, and Modify

The trial and implementation phases did not occur as two discrete operations in the project. The analysis of data from early activities, though, did serve to inform the design of later activities. The project had its beginnings in October, 2003 when the researcher, as principal of Withcott State Primary School, met with four of his colleagues from the local area of the Lockyer Valley, an eastern section of the Toowoomba Education District (see appendix D.3.a). The researcher proposed that the group develop a submission for funds from the Queensland Government ICT Innovators Grant to support professional learning about digital portfolios. A submission similar to the one in appendix D.3 was prepared by the researcher and forwarded, but was unsuccessful.

The Principal Education Officer (Performance Measurement) for the Toowoomba Education District recognised the possibilities of ePortfolios as an alternative to traditional approaches to assessment and reporting, and supported the project from its inception. He suggested that the TTMSCE be approached for funding. A submission was prepared and $A2000 was received (see appendix D.3).

A meeting was held at Withcott State Primary School in May, 2004 (see appendix D.4) for teachers and school administrators interested in developing ePortfolio frameworks. Interest in the concept even at this early stage was high, with 30 people attending the meeting. A planning committee was formed as an outcome of this meeting, with the researcher taking the role of project leader. In this role, the researcher could ensure that activities were guided by the principles of the Professional Development Framework. Appendix D is a record of activities that were implemented by the planning committee to support the network of teachers and school administrators who were engaged in learning about ePortfolios. Activities described in appendix D are presented in chronological order to demonstrate how the project developed in response to perceived needs and the availability of resources.

The story of the network tells a greater story about how the project was moulded by the environment in which it was operating. The operation of the network was continuous throughout the project, but its name and structure changed in response to funding opportunities and expanding interest in the project. It was first called the Digital Portfolio Network (DPN), which included a group of five principals in the Lockyer Valley representing schools in an eastern section of the Toowoomba Education District. The principals were unsuccessful in their application to the Queensland State Government Innovators Grants in November, 2003, but determined that the network would continue to operate.

The first workshop session was held at the Toowoomba State High School, Wilsonton Campus in July, 2004 (see appendix D.8). The format adopted at this session became the pattern for future sessions. The session commenced with an informal discussion during afternoon tea, followed by a presentation of information and cases for 30 minutes, and then three elective hands-on skill development sessions in the computer laboratories.

An email discussion list and The Learning Place project room was managed, submissions were prepared for funding, and support systems were implemented for individual teachers and groups of teachers within schools.

In November, 2004, principals in the Toowoomba Education District participated in a process to allocate $A111 000 in funding from the Education Queensland Strategic Curriculum Support initiative (SCS) and the Australian Government Quality Teaching Programme (AGQTP) to be distributed by the Toowoomba Education District for professional learning and development (see appendix D.16). The 32 principals represented very small to large primary schools, as well as secondary and special education schools. To ensure equity in the distribution of the funds, each principal was allocated ten votes to be used in three rounds of voting for the area of learning and development they considered to be most important in meeting their needs. The outcome of this voting process was that interest in ePortfolios was at the top of the list of priorities for the principals. An alliance of schools was established for each of the proposed areas of learning and development, e.g., ePortfolios, Assessment and Reporting, and Middle Phase of Learning, and each alliance prepared a submission for a share of the funds based on demonstrated need. As a result of their submission, principals involved in the Toowoomba ePortfolio Alliance (TeA) were allocated $A17 000 ($A14700 SCS and $A2300 AGQTP) (see appendixes D.16 & D.17). The term *student digital portfolios* by this time had been replaced with the term *ePortfolios.*

The Downs Education District adjoins the Toowoomba Education District on three sides. The two districts were once part of the Darling Downs Education Region, and were rejoined as part of the Darling Downs-South West Region in 2005. Office personnel from the two districts worked in the same building during 2004, including the Principal Education Officers (Performance Measurement) from each district. These two officers supported the project throughout the reporting phase, and had a key role in their position of overseeing and facilitating professional learning and development across the districts.

The Downs Education District was unable to provide direct funding for the project, but allocated a teacher in 2005 at the TTMSCE to manage The Learning Place project room and discussion list for one day each week. It was therefore necessary to change the name of the network to the ePortfolio Alliance (eA) to include The Downs Education District in the project.

The network had grown over a twelve month period from a handful of principals to include first one district of 32 schools, then another of 40 schools. Activities were attended by teachers from outside these districts, e.g., two teachers from a State Primary School near Ipswich travelled 90 kilometres to attend. The project was later extended to include a region of four districts and principals from across the state. The activities of the project are described after first investigating the appropriateness of the assessment processes.

4.4.1 Is the assessment of activities workable?

The following strategies were employed to assess activities:

1. Workshop Survey (appendix C.1);
2. Survey of Project Managers and Principals (appendix C.2);
3. Request for feedback in the CD-ROM instructions;
4. Informal feedback from participants;
5. Recording of meeting minutes (appendix D);
6. Recording of cases; and
7. Monitoring of email.

The workshop survey (see appendix C.1) was purposely kept simple as it was completed after a full school day for participants, a drive to the venue, and a two hour workshop. The conciseness of the survey also helped the collation of data, which was undertaken immediately after the workshop and a summary of results distributed to workshop facilitators, the planning committee, and district education officers. Suggestions for future sessions provided a guide for the planning committee. The survey was anonymous and comments were quite frank.

The Survey of Project Managers and Principals (see appendix C.2) provided a background for the reporting of cases as a research project. However, the survey was also valuable as a tool to encourage school administrators to reflect on specific aspects of the implementation of ePortfolios in their schools.

A request for feedback was included in the instructions distributed with the CD-ROM to all schools in the Toowoomba and The Downs Education Districts. Few people responded, but the request was nevertheless a strategy that should have been included.

Participants provided informal feedback before, during, and after workshops. The Principal Education Officers (Performance Measurement) from the two Education Districts were important sources of informal feedback because they visited schools and talked to school administrators and teachers in their schools. The recording of informal feedback is problematic because it is verbal and occurs during conversations. Informal feedback, though, has a strong influence because comments are candid and are an immediate and emotional response to situations.

The recording of meeting minutes (see appendix D) was a simple procedure that kept track of the timing and reasons for decisions.

Cases presented at the workshops were recorded on video, a simple process undertaken by the researcher using school equipment. The videos of presentations were included in the CD-ROM, while translations were typed for inclusion in appendix F.

The recording of email correspondence was a simple procedure of copying the email into the relevant section of the appendix. Email is a common communication tool in education applications because school administrators and teachers are busy people and frequently cannot be contacted by telephone directly in the first instance. The other advantage of email is that it leaves a written record of communications.

4.4.2 Are the activities workable and what changes need to be made?

Because the researcher was reporting activities for a research project, he assumed responsibility for many aspects of the project that might otherwise have been delegated to others. While the planning committee was of great assistance as described in section 4.3.12, the researcher had hands-on involvement in organising the nominations, venue, presenters, and afternoon tea for workshops which involved contact with up to 100 people for each event. This created a considerable workload, but had the desired effect of the researcher being able to personally monitor the progress of the project, adjust activities, and to collect data. The activities are described below along with an evaluation of their implementation.

4.4.2.1 Workshop sessions (after school and whole day)

There are two sets of elements in the guiding principles listed in appendix B.2.3.c that were included in the design of the workshops. The first set was the five elements of a constructivist learning environment (Jonassen, 1999) and the second set was the four sources of information that influence self-efficacy (Bandura, 1986). This section describes how this was achieved.

The whole group of approximately 90 participants would meet at the beginning of the session in the school's library that had room for everyone to be seated comfortably. The researcher would outline the program for the session and give a short presentation on *the issue* by describing the concept of ePortfolios. Some of the participants would have attended previous workshops, while the issue would have been new to others. He therefore had to carefully strike a balance between boring some and going too quickly for others, though a revision of the concept would have been useful for all attendees.

The researcher would place *information resources* on the chairs before the session commenced, and then draw the attention of the participants to aspects of the resources during this introductory presentation. Presentations would then be given of *related cases*. These presentations were given by teachers and school administrators outside the districts until sufficient local examples had been developed.

The participants would break into three groups and move to the computer labs for skill development in the use of *tools*. The workshops were conducted from 4.00 p.m. to 6.00 p.m., and at least an hour was dedicated for the skills sessions. The number of participants for each lab was limited to 30 so that each person could access a computer. Therefore the workshops were limited to a total of 90 participants. Nominations frequently exceeded this number, and those who missed out were asked to nominate for future workshops. By breaking into three groups, the workshops could better cater for individual needs and interests. Even so, it was inevitable that parts of a skill development session would be too easy or too difficult for some participants, and the aim was to ensure that there was something for everyone in each session. These sessions were conducted by experienced, local teachers and school administrators who had been identified as having skills in specific areas of technology. For example, two teachers from the art department of the Wilsonton Campus of Toowoomba State High School were skilled in graphics programs, an itinerant music teacher was skilled in audio applications, and a local principal facilitated a session on Photo Story 3 after using the program with his students. These facilitators developed resources such as guides, templates, and disks of freeware, which were included in the information resources.

Besides the *social and contextual support* that was provided during the workshop, it was recognised that the periods before and after the workshops were important times for participants to mingle and discuss issues. The library venue had a separate room where afternoon tea could be set up, and space where participants could move about from group to group. The researcher and other facilitators ensured that people knew each other and initiated conversation.

During the workshops, participants were *seeing* how others were addressing the issue of implementing ePortfolios. During the introduction by the researcher and the presentations of cases, participants were *hearing* about the theory behind the concept and *hearing* stories about practical implementation that might persuade them about the potential of ePortfolios to make a difference in children's learning. As observed by Orr (1996), the case presenters provided only enough information in their stories to establish the context. The other observations by Orr (1996) listed in section 2.10.1.1 also hold true in this project. For example, the stories originated in problematic situations and preserved and circulated "hard-won information" (pp. 125-143). The peers of the presenters could inspect and judge how well the presenters had responded to the problem. Stories were told that amused the audience, and to warn that "failure to remember the sometimes invisible or illogical connections between symptoms and causes may add hours of unnecessary diagnostic activity" (pp. 125-143).

During the hands-on skill development sessions of the workshops, participants were *doing* work similar to what they would do in the classroom, i.e., they were enacting their learning. Encouraging participants to make the transition from learning to *doing* was a constant theme of workshops and the challenge for the planning committee. That is, participants needed to have the confidence to take the first step from thinking ePortfolios are a good idea to experimenting with implementation. The stages of development of ePortfolios was useful in this regard, as it could be pointed out that children who saved their work to a directory on a computer had the foundations of an ePortfolio.

In order to nurture participant confidence, particular attention was given to *caring* about the affective needs of the learner, e.g., their comfort and feelings. Workshops always started and finished on time as people had already undertaken a day's work. They had to travel to the venue directly from their schools, apply themselves during two hours of learning, and then go home to prepare their dinner. The afternoon tea was always well presented and inviting. This demonstrated that the facilitators valued the participants and wanted to give them special treatment. The workshops were free and the nomination process was simple. One participant reported her appreciation of this arrangement as she did not have to approach her busy principal (appendix D.9.c.ii). The researcher and other facilitators would greet and farewell each participant and ensure they knew each other and were not left on their own. The skills sessions were advertised as being from introductory to advanced levels so that participants were not attending sessions in which they were overwhelmed. The introduction of the concept was kept simple and analogies used in explaining the associated theory. For example, the concept of case-based reasoning could be explained in terms of the need for a robot sent to a far away planet to have the capacity for artificial reasoning because directions could not be given from earth. No matter how many rules were entered into the robot's system, there would always be new and unfamiliar problems that the robot would encounter and have to solve. An analogy was also applied to the learning of technology skills. At the beginning of our skill development journey we see an ocean of things that need to be learned. After developing familiarity with some applications, we realise there is only a swimming pool of things to learn. Once we see that the process in one application applies in other applications, e.g., drop and drag, cut and paste, we reduce the analogy to a bathtub of things to learn. The presentation of sessions by fellow teachers and school administrators and the researcher being a local principal contributed to participant confidence. Participants readily identified with what the presenters were saying and the solutions proposed were grounded in the real world of the classroom.

The whole day sessions contained all of the elements of the after school workshops, but were offered as elective sessions conducted throughout the day. For example, the researcher would present three consecutive all-in-one sessions as described in section 4.4.2.5, while other facilitators would conduct skill development sessions or present their work as cases.

The whole day sessions were usually conducted as a stream of electives as part of the annual professional development day sponsored and organised by the TTMSCE from 2004 to 2006. During the same period, after school workshops were conducted once each term. The period in between workshops was considered important to allow time for participants to absorb the content of the learning and to experiment with the implementation of ePortfolios in their classrooms and schools.

4.4.2.2 Workshop evaluations

Participants at each of the workshops consistently demonstrated interest in the presentations. For example, the researcher recorded the following observations during a whole day workshop:

1. The four teacher presenters spoke with confidence about their work. Each made reference to the benefit they had gained from participating in the ePortfolio workshops. They also told their personal journey of perseverance in learning about ICTs and ePortfolios over several years. Their presentations reflected the various ways they had solved problems associated with implementing ePortfolios. For example, one teacher had her children draw four numbers out of a hat as a way of sharing access to four computers (appendix D.38.ii); and

2. Participants were focused on the presenters throughout the session and several made positive comments on leaving the room (appendix D.38.iii).

A question on the workshop evaluation survey (appendix C.1) requested participants to consider their needs so that these needs could be met at future workshops. The responses guided decisions about workshops, and also confirmed that the content and structure of workshops were likely to meet participant expectations. Participants were interested in seeing models of effective implementation of ePortfolios and “what other schools are finding works well” (appendix D.24.h.i), i.e., “hearing more success stories and seeing working examples” (appendix D.24.h.ii). They also requested web addresses for more information and information about The Learning Place, reflective appraisement by children, how to create a template, and the structure developed by schools to determine what should be recorded for each year level, i.e., whole school plans (appendix D.24.h.ix). The following requests by participants for development in specific skills were met at workshop sessions: digital photography; photo editing software; storage of photos and files; burning to DVD; web cam; hyperlinks; Moviemaker; packaging presentations on CD; saving as a PDF file; Japanese script; setting up computers so all these things run; and blogging. Participants specifically requested workshops that were hands-on. As one participant reported, “as long as it is hands-on it does not matter” (appendix D.24.h.viii). This applied to developing ePortfolio templates as well as skill development in the technology. The length of hands-on time that many participants perceived as being necessary for their skill development was probably never met by the workshops, as there was an expectation that participants would practise skills elsewhere.

A number of themes emerged in the analysis of the responses by participants recorded on the workshop survey (appendix C.1) and listed in appendix D. The first theme relates to how overwhelmingly positive participants were in their comments about the workshops. This is also reflected in the 1-5 ratings for each session, with a median score of all of the sessions 4.16 and a mean of 4.2. Comments indicated that participants were excited, inspired, and motivated. A participant attended a second workshop and reportedly “got momentum back” (appendix D.10.i.xiv). From observations, evaluations, and informal discussions with participants, these positive reactions can be attributed to several factors. Participants identified with the facilitators who were local skilled and experienced teachers and school administrators and whose enthusiasm was infectious. Careful planning and co-ordination ensured that presentations had a “professional” feel, e.g., sessions started and finished on time, facilitators were well prepared, hand outs and the CD-ROM were well presented, and equipment worked first time every time. By developing an understanding of the learner and the learning context and by providing social and contextual support as proposed in the design of a constructivist learning environment (Jonassen, 1999), the workshops were “teacher friendly.” This is reflected in these comments:

1. Practical examples, theory was not over ‘jargonised’ (appendix D.31.c.v);
2. Feel it is do-able (appendix D.38.d.iv); and
3. Practical and useful information, clear, visual instructions were helpful to follow (appendix D.38.e.vi).

Comments about the efficiency of the workshops also relate to this theme. Although the workshops did not cost participants any money, they were investing their time. These comments reflect a general feeling that participants were getting value for that investment:

1. Covered lots in a short time (appendix D.24.f.xii);
2. Considering I didn't know what an ePortfolio was, I learnt a great deal about their uses and equipment to aid in their creation (appendix D.38.d.i); and
3. ePortfolios are new to me and I found it very informative and a great stepping stone (appendix D.38.d.iii).

The second theme relates to the pace of the sessions. This was a difficult factor to manage and from the same workshop session there would be comments suggesting that the pace was too fast and that participants were getting lost, and other comments that the pace was appropriate or too slow, e.g., in appendix D.26.f. From his observation of the facilitators in action and on reading participant comments immediately after the workshop, the researcher concluded that participants responded well to facilitators who were enthusiastic about their topic and they would be more tolerant of other perceived failings of these facilitators, e.g., in going too slow or too fast. For example, a participant says "[the facilitator] knows his stuff but speaks very fast. He is very helpful and most generous in his sharing" (appendix D.f.vi). In the skill development sessions, participants who were not familiar with the technology appeared to appreciate a slow or even pedantic pace, i.e., where the facilitator would wait until everyone had completed the task on the screen before moving on to the next task. Those in the group who were more familiar with the application would be encouraged to support others. Offering three electives at the workshop skill development sessions was a positive response to this issue, but was never an entire solution. The number of computer labs available did not allow more electives to be offered. It was also apparent that doing a few tasks well is preferable to doing a lot of tasks at the surface level, e.g., in the comment "[we] didn't get through as much as hoped, but what we did was good" (appendix D.29.d.xiii). But at the same time, there is a need to move quickly through some sessions to give participants "a taste" of what the topic was about, and for them to later pursue aspects of interest. Decisions related to this issue reflect the complexities of teaching and the art of balancing the needs of learners as discussed in section 1.3.1.

The third theme relates to the concepts discussed in the literature review concerning related cases, cognitive flexibility, challenging teachers' beliefs, and redefining how teachers view the task of teaching. That is, participants valued the opportunity to observe practices in other schools, as reflected in these comments:

1. Applicable to all year levels and good to see teachers' own portfolios (appendix D.38.e.ii);
2. Great to have teachers sharing real materials, warts and all. [The researcher] is very supportive of novices like me (appendix D.38.e.vii);
3. Very useful to actually see some completed portfolios, to get a better understanding (appendix D.10.d.iii);
4. Good to see what schools are doing (appendix D.10.d.v);
5. Great to see examples and hear of others taking years to develop - not an overnight project (appendix 10.d.vi);
6. It is excellent to see how other schools are using ePortfolios and how they are problem solving along the way. Very encouraging (appendix D.26.c.ii);
7. Great to see the hassles that have been overcome to achieve a great result. Good combination of student and teacher control (appendix D.26.c.iv); and
8. Very good! Great to see how years one's to year seven's can all participate (appendix D.26.c.vi).

Participants could more readily visualize their own approach to implementing ePortfolios by viewing the work of others. Furthermore, seeing the practices enacted made the leap from concept to action less daunting. However, some participants sought a "one size fits all" solution to implementation and assumed they could take a template developed in another school and apply it in their own situation. While some templates became available during the project, the focus was on teachers and school administrators creating their own response supported by the knowledge and skills developed through participation in the project.

The fourth theme relates to the futures orientation of the project as reflected in these comments:

1. As a student teacher preparing to teach, these sessions provided a good window into what can be used in the future (appendix D.10.i.xiii);
2. Great to see where it all can go, especially improving teacher, student and parent relationships. Teachers presented this well (appendix D.10.d.xi)
3. Great to provide vision for what is possible and how ePortfolios can be used throughout a school, what it could look like (appendix D.26.c.v); and
4. Good to see the evolution process of learning the new technology (appendix D.26.d.v).

This is the strength of ePortfolios as a concept and the instructional design of the project in that participants develop a vision for the role of technology in education.

4.4.2.3 *ePortfolios: A learning tool* (CD-ROM)

The researcher assembled a CD-ROM in August, 2005 containing information and cases developed through network activities. The resources were organised as a web site using FrontPage, and 130 copies including labels and instructions were produced by the researcher using his office computer and printer. The CD-ROM was distributed to all schools in Toowoomba and The Downs Education Districts, as well as to senior district officers.

The title of the CD-ROM was *ePortfolios: A learning tool*. This is the same title as the booklet and was used for the same reasons, i.e., to promote the implementation of student centred formative ePortfolios. The CD-ROM opened automatically to the *Home Page* on insertion into the drive. It contained two bonus resources, *Integrating ICTs* which was developed by the TTMSCE, and *ePortfolio Resources* which was developed by the teacher at Crow's Nest State School (see section 4.3.6.4). Included in the instructions was a request for feedback. The content of the CD-ROM was structured according to the design of a constructivist learning environment as illustrated in Table 4.7.

Table 4.7: Structure and Contents of the CD-ROM

		Home Page		
Page 1. The Issue	Page 2. Information	Page 3. Cases	Page 4. Tools	Page 5. Support
Definition Benefits The Project	Literature Review Web sites The Learning Place QSITE EQ	Written Cases Video Cases	Planning FrontPage Photo Story 3 Burn CDs Hyperlinks PDF, Audio Copyright	TTMSCE The Learning Place ePortfolio Alliance Discussion List
		Bonus Resources: *Integrating ICTs and ePortfolio Resources*		

In a letter that accompanied the CD-ROM in the posting to schools, the Principal Education Officer (Performance Measurement) for The Downs District advised principals:

> This is an all encompassing resource, i.e., 'Go to Whoa!' for those interested in implementing ePortfolios. The CD-ROM is the product of the very fine work of the ePortfolios Alliance and the Technology, Mathematics and Science Centre for Excellence . . . Congratulations to the ePortfolios Alliance on this wonderful initiative (appendix E.4.c.i).

The teacher from Crow's Nest State School (see appendix F.5) responded by email. "I had a look over the CD-ROM resource. It seems really useful and well compiled. Congratulations on a great job Tom" (appendix E.4.c.ii).

The wider applications of the CD-ROM and ePortfolios in general were apparent in comments received in the comments from a lecturer at the University of Southern Queensland:

> A great resource! Currently I am leading a cross-University group to develop the first course in our newly accredited Graduate Certificate in Tertiary Teaching and Learning. I am the program coordinator . . . [for] *Exploring Teaching & Learning in Tertiary Contexts: A Critical Self-Analysis* . . . A key outcome of this course is the development of a 'teaching capacity enhancement plan' (TCEP), which will provide a self-constructed, individualised plan for further study including formal and informal courses and work-based projects. I would like to introduce the concept of 'ePortfolios' as part of the creation of a TCEP and had been looking for a framework to use. I am wondering if you would be willing to allow me to use the resources from your CD-ROM to guide my deliberations, with due acknowledgement, of course? I also recently led a university group to develop the USQ Academic Staff Development Framework and you will see that our intention is for all academic staff to develop an e-portfolio . . . I would certainly welcome any suggestions/advice, etc. you may wish to offer re any of this (appendix E.4.c.iii).

The Acting Assistant Director-General, Strategic Information and Technologies, Department of Education and the Arts requested a copy of the CD-ROM which was duly forwarded, but no feedback was received (appendix E.4.c.iv). The Director of Teaching and Learning at a primary school in Queensland sent the following email and the CD-ROM and booklet was forwarded in response:

> I emailed [name removed] about an article I read regarding ePortfolios and she gave me your contact details. We are implementing a new learning management system next year and investigating the concept of digital portfolios. I am particularly looking to talk to schools using digital portfolios in Primary schools as a way of monitoring learning across their Primary years. Can you please email me if you are using portfolios so that I may be able to ask you some questions about the process? I appreciate this is a very busy time of year but I am interested in starting some dialogue that we may be able to continue next year or you could provide me with other avenues to investigate. I look forward to your feedback (appendix E.4.c.vi).

An informal count at a whole day workshop indicated that less than 20% of teachers had seen the CD-ROM in their schools. The names of 15 teachers were recorded so that the disk could be sent to them directly (appendix E.4.d.i). In an email to the Principal Education Officers (Performance Measurement), the researcher commented at the time that "it would appear that these teachers were keen enough to nominate, travel, and attend sessions on ePortfolios, yet principals have not passed on the resource we distributed" (appendix E.4.d.i). The Principal Education Officers (Performance Measurement) for The Downs Education District replied that he would follow this up at district forums, but as he says "it really is up to the principal and teachers who know about the CD to get it in the right hands in each school" (appendix E.4.d.ii).

The value of the CD-ROM appeared to be increased when its contents were presented at workshops. For example, participants made these comments after the presentation by the teacher from Crow's Nest:

1. The CD will be great to have. Thanks. Good presentation;
2. Interesting to provide options on how to set up ePortfolios;
3. Very good at providing resources and ideas and examples for types of ePortfolios possible;
4. Extremely good value for using FrontPage as method of ePortfolios. Great idea the CD with template and resources;
5. Very useful template. Easy to follow the template. Useful tool to use at school; and
6. Great to see someone who is prepared to share and this was good hands-on for beginners (appendix D.29.c).

These comments were made after the presentation by the music teacher:

1. Answered lots of edit and copyright questions. Can't wait for disc to explore more;
2. Thanks for thinking of putting together the CD for us;
3. Great resource collection; and
4. So much info. Can't wait for the CD with all the stuff on it so I can try some (appendix D.29.f).

4.4.2.4 The Learning Place Project Room

The Learning Place Project room was managed by a person employed by The Downs Education District. The resources contained in the CD-ROM were uploaded to the Professional Learning Community at The Learning Place web site, and took the same format as the CD-ROM, i.e., the layout was similar to Table 4.7. This same format was later applied successfully in the ICTs in Mathematics project described in section 4.8.

4.4.2.5 All-in-One Sessions on ePortfolios

As the activities of the ePortfolio Project became known across the region, the researcher was invited to give presentations to introduce ePortfolios at school staff meetings, district meetings, to student teachers at the local university and at regional and state sponsored professional development events (see appendix D.33). The hardware associated with ePortfolios was purchased by the researcher and assembled in bags that could be readily packed and unpacked. The bags contained a data projector and power cords, digital movie camera, digital camera, digital SLR, web cam, digital voice recorder, external hard drive, an example of a DVD with a label printed in colour, an external DVD burner, external video grabber, pen tablet, and scanner. The software associated with ePortfolios was loaded on to a laptop for demonstration, including FrontPage, PowerPoint, Word, Access, Excel, Adobe Acrobat Reader/Writer, IrfanView (Image Editing), Paint, Movie Maker (Video Editing), Audacity (Audio Editing), Photo Story 3, and Inspiration. Hyperlinks and file management were also demonstrated.

This equipment was funded by the projects in which the researcher was involved, e.g., the ICT Pedagogy Licence project. The project facilitators would allocate one day of teacher release funding for each day he was away from his school. However, being a non-teaching principal he did not need to spend the funding on a teacher replacement, and instead used the money to purchase ICTs for the all-in-one sessions and for Withcott State School. The school also benefited financially in that the Regional Technology Manager deposited ICT related project funds into the school account for distribution. In 2007, the amount was approximately $A150 000, and the interest was kept by the school. Withcott State School is a very stable school, and senior teachers capably took charge during the principal's absences.

The instructional design of the all-in-one sessions was based on the five elements of a constructivist learning environment as listed below, demonstrating that it is possible to include all of the elements in a single lesson:

1. The issue: Outline the concept and purpose of ePortfolios;
2. Information Resources: Distribute the booklet *ePortfolios: A learning tool*;
3. Cases: Demonstrate a teacher centred and student centred ePortfolio;
4. Tools: Demonstrate the requisite hardware and software; and
5. Social and Contextual Support: Provide advice about how to access support.

The all-in-one sessions were also based on the four sources of information that influence self-efficacy: seeing; hearing; doing; and caring. The participants could see ePortfolios and hear about their value, but unfortunately time limitations prevented extensive hands-on experiences at these sessions. The equipment was passed around for participants to try, and participants were invited to use the software during demonstrations and after the end of the sessions.

The sessions were supported by notes on a PowerPoint presentation (see appendix D.33.c), and included the following points:

1. definition and types of ePortfolios:
2. advantages and issues with ePortfolios;
3. views of knowledge and constructivist learning environments;
4. software, hardware, and skills required;
5. content of ePortfolios and features of authentic assessment;
6. getting the best from ePortfolios, e.g., learner ownership and engagement, how to be reflective, deep learning, ePortfolios should tell a story;
7. advice, e.g., make a start, start small, and develop an action plan; and
8. support and facilitation through the project network.

A number of all-in-one sessions were conducted in 2006, including a whole day workshop at Chinchilla State High School, with three groups of student teachers at the University of Southern Queensland, a district network meeting of Preparatory teachers, the whole staff of Tara Shire College, and a district inservice meeting at Harristown State High School. As one of the regional co-ordinators, the researcher also presented all-in-one sessions on ePortfolios at the ICT Pedagogical Licence workshops conducted each year from 2006 to 2008 (see appendix D.37). While there was no formal process for feedback, comments by participants at these sessions were noted. For example, participants at Chinchilla State High School had submitted year 12 work in digital format to panels of the Queensland Studies Authority responsible for assessment moderation, even though the panels were thought to be behind the times and reluctant to accept work in digital format. The participants regarded equipment failures and technical support as barriers to the implementation of ePortfolios, but commented that presentations such as these ones by practicing teachers and school administrators were more useful than presentations by "experts" who did not have recent classroom experience (see appendix D.33.d).

The Regional Technology Manager invited the researcher to present all-in-one sessions on ePortfolios at a series of professional development days being offered to rural and remote schools to support the classroom implementation of ICTs. Two-day workshops were conducted between April and August 2006 at Chinchilla, Warwick, Stanthorpe, Toowoomba, Dalby, Roma, and Charleville, and the following are some of the comments received:

1. I am interested in introducing ePortfolios into the School of Distance Education starting with the lower years. I attended your workshop at the Principals' conference in Charleville last year. I would be interested in obtaining the training CD-ROM and any other materials you have that are available (appendix D.33.g.v); and
2. I attended the ICT Road Show in Chinchilla and attended your session on ePortfolios, to which might I add was a real blast. I enjoyed this session immensely and shared what I had seen with the staff at [State Primary School]. Some staff members then attended another information session with another organization in Toowoomba and came back with, what I feel, were wrong ideas and misconceptions about ePortfolios. Seeing is a lot easier for some, so I am wondering would you be able to come to [State Primary School] and present your session to our staff so they can see it's not as hard as they think it is (appendix D.33.g.vi).

An education officer from Central Office was involved in the road shows and arranged for 55 principals from across the state to visit Withcott in three groups for an all-in-one session (see appendix D.33.j).

4.4.2.6 ePortfolio Playground

A member of the planning committee suggested the idea of an ePortfolio Playground, whereby participants could bring along projects they were working on and receive peer and expert support. Three sessions were arranged in March and May, 2006 and were held for two hours after school in the computer laboratories of the Toowoomba State High School, Wilsonton Campus (see appendix D.34). The first session was attended by 15 teachers, with 13 of those teachers having attended several after school workshops while the other two were to attend a workshop the following week. The first session was introduced by the researcher who spoke about some of the latest technology including external hard drives, digital cameras, digital SLR cameras, external DVD burners, and the differences between CD and DVD for data storage. A local teacher demonstrated an interactive whiteboard, and participants broke into two groups for 20 minutes for a demonstration of web cams and Photo Story 3. The participants worked on their projects on the networked computers or their own laptops.

The researcher observed participants during the session rather than distributing an evaluation sheet. The time that participants had for working on their projects was still limited, because of the introductory section and the time taken to load projects on to computers and to develop familiarity with the particular computer setup. USB flash drives did not work on all machines, which wasted further time. It was concluded that in future participants should start on their projects from the beginning of the session. Information presented to a mixed group will be new for some participants and common place for others. The introductory section of the workshop, though, still served a purpose, and generated questions and interest. During the session, a participant had difficulty with the concept of the final process in editing video, i.e., rendering the project to a format that can be viewed on a media player. She had created 20 or more projects the previous year, but had not rendered any. Meanwhile the original video clips had been moved to other folders and she could not retrieve the projects. The Head of Department of a high school recounted the same problem occurring when a teacher submitted an ePortfolio of year 12 work as a project rather than as a rendered video clip, and consequently the state markers could not view the work.

4.4.3 Will the activities achieve the desired learning outcomes?

The discrete activities in a constructivist learning environment together represent a system. There were two distinct advantages of a systems approach to this professional development project. First, the project leader was assured that all of the appropriate areas of learning were attended to, e.g., participants had access to information resources and support in understanding those resources, exemplars in the form of cases, sessions to develop their skills, and a means of communication with facilitators and each other. The Professional Development Framework enhanced this advantage by providing a step by step guide that the project leader and facilitators could follow to plan and evaluate activities. Second, a systems approach ensured that activities were consistent with the principles driving the project and the established theory from which those principles are derived. Again, the Professional Development Framework enhanced this advantage because it is an integration of the work of several theorists emanating from the situative perspective. The complex work of these theorists has been adapted to a series of questions in the Professional Development Framework that a project leader or facilitator can readily follow to plan activities, while at the same time not losing sight of the original intention of the theorist. While these principles and established theories were communicated to participants during the *ePortfolio Project,* it was recognised that a version of the Professional Development Framework should be adapted specifically for participants. This was undertaken in the *Success for Boys Project* so that participants could plan their own actions in response to their learning needs, and gain an understanding of the instructional design of the project (see appendix B.3 & B.4). This is consistent with the aim of teaching teachers as we would want them to teach.

4.4.4 Is the assessment of learning outcomes workable?

The workshop survey (appendix C.1) provided valuable information to the researcher as project leader and to facilitators about the appropriateness of activities. However, Bain (1999) criticized an over reliance on these types of surveys in university learning projects because they focus on perceptions of learning rather than the assessment of learning outcomes. On the other hand, the information provided during the presentation of cases was directly related to learning outcomes that those participants had achieved. Furthermore, this information was easily recorded on video for later analysis. While participants may have been nervous during their presentations, they did so on a voluntary basis and in front of an audience of peers and fellow learners. During the presentations, participants assumed the role of facilitators who were sharing their learning outcomes, which took the focus away from assessment. Other approaches to the assessment of outcomes, for example, a classroom visit by the researcher, would have been more threatening and not have achieved the same result.

4.4.5 Will the learning outcomes have the desired effect on practices?

The design of the project established strong connections between learning and doing. Information sessions at workshops were followed by hands-on sessions in the computer labs. Cases presented at each workshop indicated that participants were adapting practices in response to learning outcomes, and demonstrated to other participants how this could be achieved.

4.5 *ePortfolio Project* Phase 3: Implement and Reflect

The purpose of phase three is to provide an opportunity for the project planning committee to reflect on the effectiveness and efficiency of the project, as recommended by Crompton (1996). Reigeluth (1999) associates effectiveness with the proficiency in attaining learning goals, and efficiency with the cost of the project and the time invested by facilitators and participants. Recommendations about the effectiveness and efficiency of the project should be of interest to those who provided funding, e.g., the Australian Government Quality Teaching Programme, as well to as the education organisation and to those who are considering replicating the project.

4.5.1 How effective was the project in changing practices?

At every session that he presented, the researcher asked participants if they could tell the group what it meant to teach in a way that was consistent with the constructivist perspective as this was an expectation of all recent syllabus documents. On each occasion participants were reluctant to offer responses, but when prompted by the researcher or by a participant, they were able to disclose practices such as ascertaining student prior knowledge and facilitating learning. The researcher would refer participants to differences between traditional approaches to teaching and the constructivist perspective as described in the information resource *ePortfolios: A learning tool* (appendix E.3.3). The researcher would then go on to explain the elements of a constructivist learning environment as proposed by Jonassen (1999), and relate the elements to activities in the *ePortfolio Project* as well as to activities that could be undertaken in a classroom project. This model for constructivist learning was established as a mind tool for school administrators and teachers to reassure them that they were adopting a teaching approach that was compatible with the constructivist perspective. The researcher related his experiences as a school administrator and how he used the elements of a constructivist learning environment as a checklist when providing advice to teachers about classroom projects.

This is not to suggest that all participants developed an understanding of the instructional design of the project in the first instance. However, this important learning outcome and implication for practice was reinforced through consistency of application in the planning of activities, repetition of explanations, and demonstration of the principles in practice. The effect on one participant, the deputy principal at Clifford Park State Special School, is evident in these comments:

> Yes I am (vaguely) [aware of the design]. I understand the learning framework. I think it is useful for other professional learning. I personally feel that the learning framework used is 'user-friendly' for people who have few skills in this professional area particularly if they are frightened of using technology. The workshops allowed us to 'play' with the software. Workshops across time also help with learning as we can build on information we have learnt previously. Smaller blocks of information are much easier to digest. I feel the process has been more time efficient. Learning online would not have been easily accepted by many of our staff. Participation would have been low. Personally I have gained many learnings. My own personal philosophy regarding students with disabilities and how we must be accountable for our teaching has been further enhanced this year. I am in a position where I can make a difference regarding curriculum, pedagogy, and assessment in our school (appendix F.D.b.xxix).

It is difficult to quantify the effectiveness of the project because this was not a focus of evaluation strategies and would have required the tracking of individual participants. It was estimated that over 400 participants had a direct involvement through attendance at workshops and forums, and it is unknown how many accessed the CD-ROM. Eleven cases of ePortfolio implementation were presented at the workshops, with nine of those cases as a direct result of participation in the project. Each of those cases represented more than one person. For example, the Helidon presentation was on behalf of the whole school, and the Wilsonton presentation included a deputy principal and three teachers. A question on the workshop survey asked participants if they were implementing ePortfolios, with positive responses from six out of 36 on one occasion (appendix D.10.k) and six out 22 on another (appendix D.23.h). A further question on the survey asked participants if they planned to implement ePortfolios with all 42 responses being positive at one workshop (appendix D.10.k) and all 28 being positive at another (appendix D.23.h). Comments on the workshop survey were also encouraging in response to a question about their progress with ePortfolio implementation:

1. We are still playing with it and using it without students at the moment. Still setting up PowerPoint, scanner and learning to hyperlink. Have gathered photos and played to students using [multimedia];
2. Lots of thinking and lots of talking. Time is a huge factor to our progression or lack thereof. We are finding the sessions, great. Maybe we can organise a day to play next term;
3. In school professional development on tools to contribute to ePortfolio, i.e., Web Cams, video, moviemaker, scanners etc.;
4. Thinking stage. Have heaps of photographs to document learning. Using Word to create booklets for classroom use/read;

5. Completed ePortfolios for preschoolers ready for parent teacher interviews for semester one, e.g., WAV files, photos, and simple movies of children in action, hyperlink to report card. Learnt today that I need to save report as PDF file;
6. Students critiquing own work on paper. Made digital video and editing using Movie Maker with students. Format for digital portfolio being finalised;
7. Getting teachers to learn new software and skills. Students developing pages in .ppt for use in their own ePortfolios;
8. Slow but steady. Getting there;
9. Still working on development;
10. One class is working well on Semester One work;
11. Starting out. Would love to do profile on outside school hours care children;
12. Year five children making own ePortfolio via scanning art and writing etc., web cam for oral presentations, digital photographs. Problems with various areas e.g., storage, microphones, documenting project via digital portfolio. Trying to! Don't have XP;
13. No progress beyond exploration - yet;
14. Getting the hang of it. A long way to go;
15. Moving along well;
16. Excellent considering where we started;
17. Slow, but time constraints; and
18. Still learning. Haven't started. Intend to buy own cam at [local store] for use at home until I become proficient (appendix D.26.i).

These comments indicate that participants have taken at least the first step in changing their practice as a consequence of involvement in the project. The advantage of ePortfolios as the issue for this project is that participants can implement their change in practices in logical stages and at a pace that suits individuals. Those stages are also evident in the comments above.

4.5.2 How efficient was the project in changing practices?

The efficiency of the project was enhanced by the identification of skilled teachers and school administrators who volunteered their time to facilitate workshop sessions. Some of the facilitators developed their skills before participation in the project, e.g., the teachers from Woodcrest College and the art teachers from the Wilsonton Campus of Toowoomba State High School. However, a very important outcome of the project was that participants gained skills as a result of their involvement in the project. Furthermore, they had the confidence in their ability at performing those skills to facilitate sessions. This includes those participants who presented their work as cases, and others who facilitated hands-on skill development sessions such as the principal from Pilton who took an interest in Photo Story 3.

The project received funding but was not dependent on this funding for its effectiveness. For example, the TTMSCE provided $A2000 which paid for the meals at workshops and the printing of information resources. The only advantages in not charging participants for the workshops were to simplify the registration process and so that participants did not have to approach their school administration for funds to attend. Even a small fee of $A10 per two hour workshop would have more than compensated for this funding. Funding provided by the Toowoomba Education district allowed the allocation of $A2700 to each of six schools to support the implementation of ePortfolios. Four of those schools contributed to the project by presenting their work as cases, while a fifth school, Centenary Heights State High School, held an open lesson on ePortfolios attended by the researcher. While this funding was of considerable support to participants in those schools, their interest in ePortfolios was such that it is highly likely they would have reached the same outcome without funding, albeit not in such a timely manner.

All of the online components of the project were provided free of charge to employees of Education Queensland, including The Learning Place project room and email. The Downs Education District contributed time for a co-ordinator to maintain the project room, but this task could have been allocated to an interested participant.

While participant involvement was free of cost, they were contributing their time as mentioned previously. Great care was taken in organising workshops so that participants felt they were getting value for the investment of that time, which is reflected in the following comments:

1. Covered lots in a short time (appendix D.24.f.xii);
2. So much to learn, so little time (appendix D.26.h.i);
3. Considering I didn't know what an ePortfolio was, I learnt a great deal about their uses and equipment to aid in their creation (appendix D.38.d.i); and
4. ePortfolios are new to me and I found it very informative and a great stepping stone (appendix D.38.d.iii).

The efficiency of the project highlights the value of in-house professional development that is designed and facilitated by practitioners to meet the needs of practitioners.

4.5.3 What are the recommendations for planners of similar projects?

A project of this magnitude requires considerable effort to plan and implement. A project leader needs to "work smarter" and share the load with members of the planning committee or interested participants. This did not happen to the extent that it should have in this project, because the researcher maintained a hands-on approach so that he could influence the direction of the project and collect data appropriate for a doctoral dissertation. A single person dominating the leadership of a project may alienate other potential leaders and detract from the emotional connection that members of the planning committee should develop with the project. This factor did not create any issues during the course of the project. However, when a dominant leader withdraws from a project then the project is likely to lose momentum, which was an effect observed in the *ePortfolio Project*. Nevertheless, the project does demonstrate what can be achieved by a single school-based person in influencing teaching practices across their school, their district, their region, and their state.

Project leaders, planning committees, and facilitators need to invest time in a project to achieve quality outcomes. The Professional Development Framework may appear daunting, but each phase and each guiding question has a purpose that contributes to the development of a whole system. None of the questions can be ignored without impacting on the integrity of the instructional design and consequently the generation of appropriate and sustained learning activities.

Issues that are addressed in a professional development project need to be meaningful to practitioners and fill a perceived need in their everyday practice. Furthermore, learning outcomes for participants need to be clearly related to improved outcomes for students. For these reasons, the classroom implementation of ePortfolios as the issue in this project was easy to "sell" to teachers and school administrators, and interest was easy to maintain. Another advantage of ePortfolios is that this issue represents a whole integration package. That is, teachers and school administrators could readily visualise how the implementation of ePortfolios represented an integration of all aspects of technology within a classroom or school. Administrators, for example, could see how the project would encourage teachers to develop their skills in technology and make use of expensive resources. The community would recognise that the school was making progress in delivering improved outcomes through the integration of technology. ePortfolios could also be implemented in stages determined by participants. Mind tools such as these stages of development and the elements of a constructivist learning environment allow participants to visualise what they have achieved as well as what needs to be achieved.

Project leaders and planning committees should actively seek out those who have the capacity to contribute to a project. There are skilled practitioners available locally who have much to offer and only need to be asked. The result is that session facilitators will relate well to participants because they share similar experiences, and the efficiency of the project is enhanced because the contribution is on a voluntary basis.

Finally, project leaders and planning committees should focus on the participants. They should respond to the needs and requests of the participants, and care about participants as people. Comments on the workshop surveys and during informal discussions consistently reflect participants' positive reaction to the simple considerations afforded them throughout the project, e.g., the well presented afternoon tea, ensuring sessions started and finished on time, ensuring they could hear and see facilitators, checking equipment to ensure it worked first time every time, and following up questions and requests for support. This is a key factor in a successful professional development project, and responds to the paradox that Cuban (1993) notes "of teachers being both the problem and the solution" (p. 274). Teachers must be central to any process of change.

4.6 *ePortfolio Project* Phase 4: Sustain and Monitor

Phase four provided an opportunity for the planning committee to consider on-going strategies to sustain participant learning and to encourage participants to continue to implement changes in practices.

4.6.1 What needs to happen to sustain learning?

The *ePortfolio Project* was active from the end of 2003 to the end of 2006. From 2006 to 2008, the researcher focused on presenting all-in-one sessions and was a leader in the regional ICT Pedagogy Licence program. Because the project was being reported in a doctoral dissertation, the researcher had taken a leadership role in the *ePortfolio Project* and a hands-on approach to the organisation of activities. The project would have been sustained even longer if he had given more attention to building a leadership group to take over when he moved on to writing the report and becoming involved in other aspects of professional development for technology integration.

4.6.2 What needs to happen to sustain changes in practices?

There continues to be a need for an alternate approach to assessment and reporting in Queensland schools as offered by the implementation of ePortfolios in classrooms. From 2006, all Australian public schools were required to issue student reports with A-E ratings for each of the key learning areas. While this style of reporting was introduced for consistency and simplicity of interpretation, teachers and school administrators are frustrated by the limited information provided to parents. The implementation of the Education Queensland ICT Pedagogical Licence has raised the profile of the role of technology in schools, and access to technology continues to improve, e.g., through the Education Queensland *Laptops for Teachers* program. The *One School* program being introduced across the state is also requiring teachers to become familiar with technology, as they need to access the program to create student reports and record student behaviour. Many schools directed funding from a recent Australian Government school renewal program towards the purchase of technology, e.g., electronic whiteboards. Withcott State School, for example, installed data projectors in every classroom with this funding. This is on top of the annual ICT grant provided by the state. In summary, there continues to be a need for ePortfolios, the implementation of ePortfolios continues to be a logical progression in the application of technology in schools, there is improved access to technology, and the education organisation is promoting innovative approaches to technology integration.

The sustaining of changes in practices as a result of participation in the *ePortfolio Project* would be enhanced if the workshops were reintroduced, which may be considered by the researcher. A less intensive approach may be to canvass teachers and school administrators about their progress with the implementation of ePortfolios and circulate the results. The teachers at Withcott State School who had been involved in the project continue to implement ePortfolios in their classrooms (see appendix F.11.D). There are now other teachers who have observed what these teachers are doing, and have expressed an interest in implementing ePortfolios as well. The teachers who had previously been involved would benefit from further workshops by interacting with teachers and school administrators and comparing each other's progress. The teachers new to these experiences would benefit in the same way as the original participants. In the meantime, the researcher continues to promote the concept of ePortfolios through his involvement in the ICT Pedagogy Licence program and Regional ICT Reference Committee, and supports the teachers in his school in the implementation of ePortfolios.

4.6.3 What were the benefits to the organization?

As discussed in the literature review, Argyris and Schön (1996) believe that benefits to an organisation begin with a problem encountered by an individual within that organisation. The researcher initiated the project because of a perceived mismatch between what was happening with professional development for technology integration and what he knew could be achieved. Through his reflections and actions, he created new “images of organisation” (p. 16) and new understandings so that the outcomes of professional development would be aligned with his expectations. Argyris and Schön (1996) suggest that the learning that occurs through the thought and actions of the researcher becomes organisational when other individuals in the organisation arrive at the same understanding and the learning is reflected in artefacts of the organisation, such as the ePortfolio programs implemented in schools and the memories of teachers and school administrators. The capacity of the reflections and actions of the researcher to bring about organisational change was acknowledged in his appointment to the Regional Reference Committee for Professional Development (appendix I), and more recently through his appointment to the Regional Reference Committee for ICTs.

The *ePortfolio Project* was not a systemic priority and yet it attracted a great deal of interest from teachers and school administrators. There are implications for those who decide systemic priorities and whether or not those priorities are reflecting the needs of teachers and school administrators and the issues that concern them most. At the time that the project was operational there was a vacuum in the professional development of teachers and school administrators in the integration of technology. Towards the end of the project Education Queensland introduced the Smart Classrooms Professional Development Framework which included the ICT Pedagogical Licence, but this program focuses on assessing what participants know and do, rather than on development. The need for professional networking has been recognized and established recently on a voluntary basis in some districts, e.g., in The Downs Education District there is the GetSmart Network and in the Toowoomba Education District there is the Smart Classrooms Network. However, there remains no program or project in the region that matches the enthusiasm, the effort, the co-operation, the learning, and the changes in practices that were generated by the *ePortfolio Project*. The researcher received a regional award on behalf of the ePortfolio Alliance at the Education Queensland Showcase in July, 2006 in recognition of the value of the project (appendix D.36).

The *ePortfolio Project* encouraged teachers to share their work as cases and to participate in a learning network. This collaborative approach to professional development is serving to reverse conclusions in the DEST (2001) report “of the teaching profession as being practice ‘behind closed doors’” (p. 3). The education organisation has a large investment in The Learning Place as an online facility to support teachers and school administrators. The *ePortfolio Project* demonstrated how this resource can be used in meaningful ways. Technology is an even larger area of investment for the organisation, and the *ePortfolio Project* proposed innovative ways for that technology to become integrated into every aspect of classroom activity. A benefit to the organisation that was apparent to participants was the potential of the *ePortfolio Project* to enhance student outcomes. This was the principal reason why teachers and school administrators participated in the project, and this aspect of the project involves the core business of the organisation.

The resources developed during the project continue to be used by the researcher in presentations at workshops for the Education Queensland ICT Pedagogy Licence (appendix D. 37), and a record of the stored knowledge pertaining to the project remains in schools in the form of the CD-ROM. ePortfolios continue to be developed in schools, e.g., at Withcott State School, at the time of writing, a teacher requested the support of the researcher to implement ePortfolios in her classroom.

4.7 Refining the Professional Development Framework

The involvement of the researcher and his school in the *Success for Boys Project* was an opportunity to refine the Professional Development Framework (see appendix B) and to trial it in another project. While the principles, phases, and elements of the Professional Development Framework were applied in the *ePortfolio Project*, the framework did not exist at that time in its current format. As more became known about the *Success for Boys Project*, it became apparent there would be three roles for the framework. First, the framework would guide the planning and evaluation of the whole project. Second, it would guide the planning and evaluation of projects developed at individual school sites. Third, it would guide individuals who would be planning their own learning and intervention strategies. The bonus in having a framework to support individual planning was in promoting understanding of the principles involved to enhance metacognitive reflection, and therefore encouraging teachers to teach as they were taught.

The researcher met several times with groups of principals involved with the *Success for Boys Project* and discussed the philosophy behind the framework and presented draft versions. Discussions were also held with the Regional Professional Development Co-ordinator, who had been recently appointed. She made suggestions and forwarded the framework on to colleagues for further comment. As explained earlier, the researcher did not have the same personal involvement in the *Success for Boys Project*, and it was apparent the framework would have to develop into a discrete package that an educator could read, understand, and implement. There were advantages in that the potential applications of the framework would be enhanced, i.e., it could become a stand alone model for professional development programs as discussed in section 4.13. The disadvantages were that the language would have to be “dumbed down” so that it could be readily understood by busy teachers and school administrators. A further problem was the size of the framework in terms of the number of questions to be addressed. Each question is critical to the process, but it requires considerable effort to satisfactorily address each question. This is quite appropriate in the detailed reporting of a research project as reflected in sections 4.2 to 4.6. However, teachers and school administrators are likely to baulk at the prospect of investing so much time, for example, in investigating the issue and context. They would no doubt prefer to spend that time on intervention strategies.

Therein is a major problem for this study. As described in chapter one, teaching is a complex domain with ill-structured problems that require complex and well considered solutions. As demonstrated in the *ePortfolio Project*, the Professional Development Framework has the potential to provide those solutions. However, unless the framework is within the capacity of project leaders to understand and is seen to be worth the investment in time to undertake, then it has no value at all. This issue is central to research question three, and will be a focus of the reporting of the *Success for Boys Project*.

The presentation of the framework as a series of questions was considered to make the tasks in each phase clear to project planners. However, it was important that the questions had a logical flow and were seen to build information and understanding that could be used to design activities and then evaluate those activities. Experiences in the *ePortfolio Project* were invaluable in this regard. The result was a unique combination of: Bain’s (1999) four phases of a professional development project; Jonassen’s (1999) proposal to develop constructivist learning environments; Bandura’s (1986) four sources of information to influence self-efficacy; the literature on case-based reasoning that belonged to another discipline; and concepts from the situative perspective such as cognitive flexibility, cognitive apprenticeship, and the experienced cognition framework. The task was made easier in that these concepts are aligned, but was difficult in that the concepts are complex and not easily understood, as suggested earlier, by busy teachers and school administrators. As an experienced principal, the researcher presented the concepts in appendixes B.2 and B.4 in ways that he knew would be understood in the context, and rephrased terms to be user friendly. As explained earlier, the terms *physical, thinking*, and *communication tools* and *seeing, hearing, doing,* and *caring* were adopted.

The framework was further refined during the process of reporting this study in a publication (Otto, 2008). For the purposes of the publication, the flow of questions, the phrasing of questions, and the explanation of concepts had to be understood by an international audience with no contact by the researcher whatsoever. This final version is presented in appendix B.

4.8 *Success for Boys Project*

The principal of Toowoomba State High School was successful in applying for $A70 000 in funding to support a *Success for Boys Project* for his school and the primary schools that send students to his school, including Withcott State School. The researcher took on the role of research manager. The *Success for Boys* program was sponsored by the Australian Government and the materials were prepared by Alloway, Dalley-Trim, Gilbert, and Trist (2006). All participants attended a *Core Module* workshop to introduce the issue, disseminate information, and to outline the process of taking a whole school approach to analysing the context and devising intervention strategies. A further four elective workshop modules were offered to participants, including: *Boys and Literacy*; *Mentoring for Success*; *Boys and ICT*; and *Indigenous Boys*. The funding paid the costs of presenting the workshops and for school-based projects. The researcher presented sessions at the *Core Module* workshops and at *ICTs and Boys Modul*e workshops in another district, which was a further opportunity to apply the Action Plans.

The reporting of the *Success for Boys Project* takes a different format to the reporting of the *ePortfolio Project*. First, the researcher had a different role in this project, and did not have the control over activities and the personal involvement that was a feature of the *ePortfolio Project*. However, he was able to influence key elements of the project. For example, he was able to introduce the action plans of the Professional Development Framework into the project, which was not part of the original Success for Boys program. Second, the relevance of the project to this study is how the Professional Development Framework was refined during this project, and the appropriateness of the framework in addressing the issue. The discussion will reflect these points, but at the same time will be organised around the general headings of the framework.

4.8.1 The Issue

Alloway et al. (2006) establish the background to the issue in the handbook for facilitators. The House of Representatives Standing Committee on Education and Training had conducted an inquiry in 2002 into the education of boys in Australian schools, and concluded that the achievement of boys was lagging behind the achievement of girls across a range of measures. Particular concerns focused on literacy, school retention, participation in higher education, and rates of school suspension and exclusion:

1. 4.4 per cent fewer year five boys achieved the national reading benchmarks;
2. The retention rate of boys to year 12 was 11 percentage points lower than the retention rate of girls;
3. Boys are achieving lower average marks in most subjects at year 12;
4. About 56 per cent of university commencements are female students; and
5. Suspensions and expulsions involve many more boys than girls (Alloway et al., 2006, p. 27).

Alloway et al. (2006) report boys have a clear and uniform perspective about the cause of the issue. That is, adults do not listen to what they have to say and do not have a genuine interest in their views. This perspective is reflected in the following attitudes:

1. Most boys don’t value school; it’s more about getting credentials than learning;
2. School work is boring, repetitive and irrelevant;
3. School doesn’t offer the courses that most boys want to do, namely courses and coursework that prepare them for employment;
4. Most boys neglect or reject homework because it is too intrusive, destructive and ultimately unachievable without sacrificing more valued aspects of their lives;
5. Years eight, nine and ten waste too much time. The Year 11 workload is excessive; and

6. School pushes most boys into a downward spiral of disaffection, resistance, resentment, anger and retaliation that, for many, is just too hard to stop (Alloway et al., 2006, p. 28).

4.8.1.1 Design of the professional development
The *Success for Boys* program was one of several initiatives by the Australian Government to address this issue, and was directed at providing quality professional development for teachers of boys in the compulsory years of schooling. During 2006 and 2007 approximately 1,600 schools received grants to support projects at individual or clusters of sites. The facilitators' handbook was designed to enable teachers to deliver professional development to other teachers. The aims of the program were:

1. To provide teachers with a conceptual framework for approaching boys' education;
2. To develop teachers' knowledge and understanding of concepts related to boys' education;
3. To give schools strategies for conducting whole-school planning and change management, and classroom-based action research projects; and
4. To provide teachers with readings, workshop activities, practical strategies, case studies and other resources related to improving boys' learning outcomes and their engagement in classroom learning (Alloway et al., 2006, p. 2).

The aims and principles of the program were consistent with the principles that guided the *ePortfolio Project*, and the researcher took advantage of the opportunity to apply the Professional Development Framework in attending to this different issue. Many participants at the *Success for Boys* workshops were either aware of the researcher's involvement in the *ePortfolio Project* or had attended workshops that he had organised. Similar to the *ePortfolio Project*, there was an expectation that the professional development activities would be supported by a network of learners. The focus of the activities was to develop a better understanding of boys and to expand the repertoires of practice in schools so that boys would be more engaged in learning. The areas that required better understanding were boys':

1. sense of self;
2. their relationships with other; and
3. the cultures within which these develop (Alloway et al., 2006, p. 34).

These understandings would be embedded in high-quality classroom pedagogy and whole school practices and structures.

The resources that accompany the *Success for Boys* program provide PowerPoint presentations, accompanying notes, and suggested activities. The design of the professional development is also clearly articulated. For example, the program lists these principles of adult learning for the information of facilitators:

1. Adults need to know why the new knowledge is important and relevant to them and their workplace;
2. Adult professionals are capable of directing themselves and expect others to recognise this;
3. The role of the educator of adults is more one of a guide and facilitator who acknowledges the knowledge and experience of the participants;
4. Adults are ready to learn those things that will help them to cope more effectively with new or changed expectations; and
5. Adults learn new knowledge, understanding, skills, values and attitudes more effectively when these are presented in the context of 'real-life' applications (Alloway et al., 2006, pp. 6-7).

4.8.1.2 The context of the professional development
The *Core Module* was delivered at a workshop by the principal of Toowoomba State High School and the researcher at Highfields Cultural Centre with 105 participants in April, 2006 and again at the Middle Ridge Golf Club with 176 participants in May, 2006. Participants included staff from the Toowoomba State High School and the cluster of primary schools that have students enrol at that high school after year seven. The term *staff* is used because participants

included teachers, school administrators, and ancillary staff such as administrative officers, teacher aides, and janitorial staff. A key strategy was to develop a whole school response to the issue and therefore all members of a school staff needed to be involved. This is to promote ownership of intervention strategies and consistency in the implementation of those strategies. Elective workshops were held at later dates, and the *Mentoring for Success Module* attracted 35 participants, the *Indigenous Boys Module* 45 participants, the *Boys and Literacy Module* 38 participants, and the *Boys and ICTs Module* 45 participants.

In consideration of their affective needs, care was taken in the planning of the *Core Module* workshops to ensure that participants were engaged, that they were comfortable during the presentations, that they felt this was an important issue, and that they were special people because only they could address the issue. At the end of the *Core Module* workshops, participants were asked to complete the evaluation survey, which was prepared by the researcher from his experience with the *ePortfolio Project*. The results are summarized in appendix G.5. The mean for the 1-5 Likert ratings for both presentations was 3.9 (see Table G.4). Participants expressed a preference for: time to process information; presenters who did not read PowerPoint slides; practical hands-on activities; practical examples; a slow pace; interactive activities; ease of viewing the screen; and slide colour other than light blue. They appreciated that the session inspired teachers to change their pedagogy, was based on research, and reflected current beliefs and philosophies. The special care taken in arranging a pleasant venue and enjoyable meal was reflected in the mean of 4.4 for the 1-5 Likert rating of the venue and meal (Table G.5). One participant reflects a common comment by saying “providing a meal makes us feel like professionals. Thanks for treating us as business would” (appendix G.5.i.x). The advantages and disadvantages of each of the venues are reflected in the comments:

1. Highfields: Comfortable, excellent AV, delicious meal, extravagant event for Education Queensland staff thanks to Commonwealth funding, unobtrusive service; and
2. Middle Ridge: Excellent meal, needed coffee, problems seeing data screen, too noisy (teachers talk too much), a little squished, great service (appendix G.5.h).

Participants commented on the benefits of having primary and secondary staff at the same seminar, and enjoyed going out on a special occasion with other members of their own staff and meeting other school staff. They interpreted the number of people involved as an indication of the importance of the issue. Participants reported that the presentation was a good introduction to the issue, and they felt energised, challenged, interested.

The researcher presented the section of the *Core Module* relating to effective intervention strategies and the whole school plan that each school was expected to develop in response to the issue. This section related to his work in the *ePortfolio Project* and to the action plans of the Professional Development Framework. The other section of the *Core Module* related to establishing the problem and understanding the relevant data, and was presented by other principals. The researcher presented his session three times, namely at Highfields, the Middle Ridge Golf Club, and later at Tara as part of that district’s project. By reflecting on his own presentations and observing the two principals who presented the other sessions, i.e., two at Toowoomba and one at Tara, the researcher reached the following conclusions. Facilitators are more relaxed on the second presentation of the same material, as they are familiar with the content and know what to expect, e.g., the amount of time required. Participants are engaged by anecdotes with a local flavour or that they can relate to. As reflected in participants’ comments, it is important to be able to speak with confidence and only use the PowerPoint presentation as background material.

4.8.1.3 The changes

A question in the workshop survey asked participants about their perceptions of what new practices needed to be implemented (appendix G.5.d). The content of the workshop presentations and group interactions during the workshops initiated a range of responses indicating that participants had a good understanding of the new practices. For example, they recommended that more hands-on and real life experiences should be incorporated into lessons, including the use of ICTs, and that boys should be allowed to move around during lessons. They appreciated that boys are engaged by competitions and acknowledged the importance of role models. In developing a more personal relationship with boys, teachers need to ask boys what they want and to listen to them, and they need to develop a greater awareness of the way boys would like to be treated. Responses to boys' behaviour need to be less confronting and more patient. On the curriculum side, developing literacy skills was seen as a way of building self-esteem, and that scaffolding tasks would support boys as learners.

Alloway et al. (2006) suggest that whole school involvement in this project presents an opportunity to review the alignment of curriculum, pedagogic practice, assessment, and reporting. For example, assessment should not be separate from teaching, it should be aligned with teaching and learning goals, and students need to engage in self-assessment and peer-assessment. Students should be encouraged to identify what they need to do to improve, e.g., they need to understand how performances are judged. Furthermore, students need to be to break learning goals into smaller goals.

The *Success for Boys Project* provided the researcher with another opportunity to promote the concept of ePortfolios. Information about ePortfolios was provided in the recommended Whole School Plan distributed to all participants, and his presentation of the *ICTs and Boys Module* at Tara Shire College and Meandarra included a section on ePortfolios.

4.8.1.4 The learners

Schools in the Toowoomba area are noted for having an older population of staff. They have usually completed service in rural and remote areas and spend the rest of their career in the regional city of 100 000 people in order to be close to services, high schools, the university and TAFE College, and recreation venues. This is significant in that most of the participants had children of their own and readily identified with the issues as they were raised. As one comment from the survey relates, "these are our sons and our future generation" (appendix G.5.b.vi). A question in the workshop survey asked about the importance of improving boys' success and why (appendix G.5.b). Responses were received from 141 of the 281 participants and the mean for this question on ratings from 1-5 was high at 4.8 (see Table G.1). The comments also demonstrate a clear understanding by participants as to why this issue is important. For example, at the macro level boys are seen as "underachieving and not engaged," and addressing their social problems will "develop responsible citizens" and "create a better society" (appendix G.5.b). At the micro level participants reported that successful intervention strategies will lead to "better classroom behaviour and environment" (appendix G.5.b.viii). There was recognition that current approaches to boys' education are simply not working as well as they could or should, and that a similar investment in girls to improve their success should now be directed towards boys.

The Toowoomba State High School principal provided all participants with a *Success for Boys* pen that had a light in the tip. This gimmick was a great talking point for participants and engaged them in conversation with others at their table. It also would have reminded them about the workshops for some time afterwards.

4.8.2 Related Cases

Related cases were of particular relevance to this project. Teachers and school administrators were aware of the issue of the success of boys in their schools, and would have already been implementing strategies to address the issue before the workshops. This is reflected in comments such as "much of the information was already known" (appendix G.5.c.iv). Their reason for attending the workshops was to access new information and strategies that would be more effective, e.g., the "need to change/re jig what we are doing" (appendix G.5.c.v). As with the templates in the *ePortfolio Project*, many participants were seeking ready made solutions, and were no doubt disappointed to learn that this was not to be the case. Strategies to improve the success for boys are context specific and are more effective if they are developed and "owned" by the whole school staff, including those who teach and those who do not teach. The case-based reasoning cycle is suited to such issues. That is, in devising strategies school staff consider what they know already and what they are able to access from stored knowledge including cases in other schools and the information resources. They trial the devised strategy and if it works it can be recorded as a new case. If it does not work they can revise the strategy and trial it again. In this way there is a growing knowledge base in the form of cases that can be drawn on by other schools.

4.8.3 Information Resources

Information in the program's information pack was enhanced by resources collated by the researcher and distributed to participants as listed in Table 4.8.

Table 4.8: *Success for Boys* Resources

Section 1: PowerPoint	Presentation by Dr T.L. Otto
Section 2: Teaching with ICTs	Exemplary Teaching with ICTs by Dr T.L. Otto Resource 7: Active Engaged Hands-on learning Resource 8: Case Studies Resource 9: Five Principles of Classroom Practice Resource 10: Making Sense of Literacy Resource 28: Learning in an Online World Resource 29: Assessment Devices
Section 3: Using ICTs to Expand Repertoires of Practice	How ICTs can Expand Students' Repertoires of Practice Resource 11: ICT Integration Mind Map Resource 6: Mind Tools Resource 12: Some ICT Functions for Classroom Use Resource 13: Web Links Resource 14: Clay Animation Resource 15: Digital Video Resource 16: Hypermedia & PowerPoint Resource 17: TV Production Resource 18: Lego Resource 19: Computers in the Science Lab Resource 21: Web Quests Resource 22: Web-Based Learning
Section 4: Activities	Enablers and Disablers of Boy's Engagement Investigation of an Issue

One of the purposes of the workshops was to support participants' understanding of the resources. The information that participants found to be important as reported in the workshop survey is summarized below:

1. It is a global problem;
2. Data counters myths;
3. Defining what is masculinity in a changing world;
4. Solutions require a concerted, planned approach that involves the whole school community; and
5. The mismatch between boys' lives and school experience (appendix G.5.c).

4.8.4 Tools

ICTs were the most important physical tools associated with the project as these were considered to promote student engagement. One of the elective modules focused on ICTs for this reason. The researcher presented this module at Meandarra and Tara Shire College and was able to include much of the content of an all-in-one session developed in the *ePortfolio Project* (see appendix G.8). The action plans for project facilitators and individuals were the most important thinking tools, as they supported participants in planning their responses. Support for developing understanding of the plans was provided by the researcher during the *Core Module* workshops.

4.8.5 Social and Contextual Support

The funding provided by the Australian Government supported school-based projects. While individual schools made decisions about how that money was allocated, there was an opportunity for those sites to provide social and contextual support. For example, they could release teachers or other staff to manage the project, collect and analyse data, investigate and report on other cases, collate and disseminate information, or facilitate one-on-one or small group contact with boys. The funds could also be spent on resources such as ICT software and hardware to enhance projects relating to that module.

The other mechanism to provide social and contextual support was the establishment of a learning network. By bringing together large numbers of school staff from Toowoomba State High School and its feeder primary schools at the *Core Module* workshops, those people identified with belonging to a network of learners. Other professional development activities arranged since that time reinforced that notion of a learning network. Furthermore, the information and cases relating to the project were uploaded to The Learning Place project room, which was accessible by everyone involved.

4.8.6 Planning for School Projects

Similar to professional development for technology integration, improving outcomes for boys is a complex issue requiring thoughtful planning and perseverance, and an effective response requires a whole school approach. An information sheet was prepared by the researcher and titled *Planning a Whole School Project* (see appendix G.4). This sheet was distributed at the *Core Module* workshops and was available from The Learning Place project room, along with the Facilitator Action Plan and the Participant Action Plan and the associated information that together make up the Professional Development Framework. The sessions presented by the researcher at the *Core Module* explained how these resources and plans could be used and the importance of having a systematic and whole school approach if the response is to be sustainable and effective. A whole school approach means that individually and collectively all members of a school staff need to become researchers as they engage with the issue, identify and implement strategies, and collect and analyze data to measure the effectiveness of those strategies. One of the factors impacting on the success of boys concerns their interactions with adults and other students, and interventions therefore need to be applied consistently. The focus of a whole school approach was to uncover pedagogic practices that work and sharing these within the school and beyond (appendix G.4).

The Action Plans in the Professional Development Framework (see appendix B) advise each school to establish a planning committee to oversee school based projects. The following list of questions in the information sheet, *Planning a Whole School Project*, was collated to assist the project leader and committee members in their planning. The questions reflect key elements of the Professional Development Framework:

1. What are the specific issues at our school?
2. What is our context?
3. What do we hope to get out of the project?
4. What practices are already working well in the school?
5. What practices or projects should be trialled and implemented?
6. How will all members of staff be encouraged to engage with this issue?
7. What data sources do we have already?
8. What other data will we need to collect and how will it be collected?
9. What is the data telling us about our boys now?
10. What data will we need as evidence that our strategies have improved outcomes?
11. Do all members of staff have access to and can they use The Learning Place?
12. How will staff access information and be supported in understanding the information?
13. How will staff access cases?
14. How will the cases we develop be disseminated?
15. How will skills in the use of tools be developed?
16. What support will staff require in developing and implementing new strategies?
17. What activities are planned to introduce staff to new strategies?
18. What incentives will there be for members of staff to be innovative and productive in this issue? and
19. How can the project be sustained? (Adapted from appendix G.4.e)

One of the key strategies of the *Success for Boys* program developed by Alloway et al. (2006) was extensive data collection before and after project implementation. The purpose was to increase understanding of issues in particular contexts and to establish base line data for the monitoring of progress (appendix G.4.f). This strategy was adapted and enhanced in the whole school plan that the researcher developed and distributed to participants. Qualitative and quantitative data should be considered and sources include: surveys; questionnaires; interviews; teacher judgements; class assessments and reports; literacy measures; school retention records; results for years ten and twelve; admissions to higher education; attendance records; behaviour incidents; suspensions; expulsions; and student opinion survey data. It was advised that the value of collected data is limited by the extent to which it is analysed and used to inform practice. Consideration may be given to gender, socio-economic status, cultural background and indigeneity, and the identification of the specific learning needs for individual and groups of boys and students at risk (appendix G.4.g). It was recommended that evaluation plans consider these elements:

1. Purpose: Why evaluate?
2. Will the evaluation serve formative and/or summative purposes?
3. Audience: Who is the evaluation for?
4. Will the audience be teachers, parents, students, or researchers?
5. Data: What kinds of data are needed?
6. What criteria will be used for selection?
7. Timing: When is the information needed?
8. Personnel: Who will collect the data?
9. Who will analyse the data? and
10. Reporting: How will the information be communicated (appendix G.4.h)?

The teachers at Withcott State School collected and analysed data pertaining to their students (see appendix G.6). Almost without exception, the children at Withcott come from stable middle class families with both parents in full time work and who own their homes. The boys at this school appear to perform quite well. However, while there may be a tendency for the highest performers to be boys, there is also a tendency for the lowest performers to also be boys. An informal survey of boys and girls in year seven revealed that the children are aware that the two genders have different characteristics and that they are treated differently as a consequence of those characteristics, even though both genders are treated fairly. It would be reasonable to expect children to be aware that boys are likely to be rowdier in their behaviour and therefore teachers respond accordingly. However, the children were also aware that the girls do not get to answer as many questions because classroom talk is dominated by boys.

4.8.7 Effectiveness of the Project

One of the questions on the *Core Module* workshop survey asked participants about the information provided to undertake a whole school approach and the Facilitator and Individual Action Plans as presented by the researcher. The mean of the responses on the five point Likert scale was 3.7. This result was lower than for other sections of the same workshop, and the reasons are apparent in their comments:

1. Good starting point but need to read and digest information;
2. Need to talk to the rest of the staff;
3. Resources for the beginner are well organised and helpful in getting started;
4. Thought provoking;
5. Needs coordination at a whole school level;
6. The individual action plan is very comprehensive and prescriptive;
7. Provides a workable rubric for brainstorming practical approaches to change reflection;
8. Usual problem of time;
9. Have notions but these have to be actualised;
10. We have the plan but how many people will be on board; and
11. Motivating (appendix G.5.e).

The participants understood the need for a collective response in their schools and they could see the value of the plans, particularly as they represent an approach that is systematic and comprehensive. However, they recognised the amount of work involved in the process, and while some staff members would be willing to sacrifice that time to achieve an effective outcome, there are others who would not.

From his observations and analysis of the data, the principal of Toowoomba State High School reported the following outcomes to the Australian Government to account for the funding:

1. Teachers have significantly increased understanding of how boys' engagement and learning can be improved. They are engaging with students in their classrooms on a level not experienced in the past;
2. We are developing a collection of cases that identify local successful strategies for boys;
3. We are using data in more meaningful ways; and
4. Boys who are at risk are having significant interventions as a result of improved identification (appendix G.7).

The benefits to the organization in undertaking this project are similar to the *ePortfolio Project*. The *Success for Boys Project* was not a systemic priority and yet it, too, attracted a great deal of interest from school staff. Both projects encouraged teachers to share their work as cases and to participate in a learning network, utilised The Learning Place as a resource, and implemented innovative ways to realise the potential of technology. While the *ePortfolio Project* might contribute to teachers' stress as they learn to use technology and manage implementation processes, alleviating issues with boys should reduce teacher stress. As one participant says "teacher sanity will improve" (appendix G.5.b.xiv). Both projects enhanced student outcomes, which was the motivating factor for participation and is the core business of the organisation. Participants commented that boys are "our future generation" (appendix G.5.b.vi) and improving their achievements will "make society better and develop responsible citizens" (appendix G.5.b.vii).

4.9 *ICTs in Mathematics Project*

During 2006, the Regional Technology Manager procured funding for an *ICT in Mathematics Project* for the Darling Downs-South West Queensland Education Region, and invited the researcher to present sessions and to guide the instructional design of the project. This professional development opportunity was offered to 12 teachers from each of the four education districts in the region. In advice provided to schools (appendix H.1.b), it was expected the project would facilitate the development of the curriculum, pedagogy, and assessment that utilises ICTs in Mathematics and that participants would develop a project of their choosing at their school. Participants were required to have good ICT skills, to be willing to share their learning with other teachers, and to be willing for schools in their cluster to utilise their skills. The initial one and a half day workshop focused on tools accessible at The Learning Place, previous cases of online mathematics projects, Learning Objects, Microsoft Producer, and Web Quests. Funding paid for a teacher from Wilsonton State School to co-ordinate the project one day each week. This teacher had participated in the *ePortfolio Project* and had presented her work as a case.

On the advice of the researcher, the co-ordinator designed the online project room developed for the project around the five elements of a constructivist learning environment (Jonassen, 1999). This was similar to the design of the CD-ROM collated for the *ePortfolio Project* (see appendix E.4). The co-ordinator demonstrated the knowledge she had gained about constructivist learning environments from participating in the *ePortfolio Project* and from discussions with researcher, when she explained the instructional design of the project at the initial workshop (see appendix H.1.c.iii). During an interview with the researcher, the co-ordinator spoke enthusiastically about the usefulness of this design (see appendix H.2). For example, she found the design brought the project together as a package (appendix H.2.a.iv). The co-ordinator reached conclusions similar to those of the researcher (see section 4.5.1) about the usefulness of the five elements of a constructivist learning environment as a checklist for developing projects:

> For me as a facilitator, it was so easy to, the way it was set up, so easy for me to gather information and put it in its various spots and all the tools were easily identifiable and I

> could put in the relevant information teachers may need. To me it was both a really valuable learning tool to know what would be needed and a valuable tool for them to access while they were improving their ICT skills as well. It was so easy to find things, so easy to put them in the relevant pockets, it made things very easy (appendix H.2.a.ii).

The co-ordinator also commented that an investment of time in developing a constructivist learning environment ultimately saved time because participants could access the information and tools they needed more efficiently and effectively (appendix H.2.a.vii, x). Early in the project, the co-ordinator realised that participants without adequate ICTs skills initially found the online structure “a little overwhelming” (appendix H.2.a.xiv). Her response was to provide social and contextual support as recommended by Jonassen (1999). She achieved this in one example by visiting the participant’s school and enlisting the support of the principal, and working one-on-one with the participant (see appendix H.2.a.xiv). Similar to strategies in the *ePortfolio Project* to avoid overwhelming participants, she assured the teacher that ICTs could be implemented in stages and that capacity could be built through simple applications. She provided the teacher with some simple ideas that the teacher had not considered and “it was like a light had switched on” (appendix H.2.a.xxii). This point was also reflected in the following comment: “People thought they had to produce a whiz bang project but this has taught them they don’t have to and they can use ICTs in easy simple ways they wouldn’t normally think about” (appendix H.2.a.xxii).

The co-ordinator also highlighted problems associated with making assumptions about what participants can and cannot do as a result of not conducting a thorough investigation to understand the learners and their context. For example, she assumed that all participants were regularly reading their emails, and had to reassess her strategies when this proved to be incorrect (appendix H.2.a.xviii). Most importantly, the co-ordinator was satisfied that children benefited from the project and that the project was effective:

> Every single person that I’ve worked with, everybody has said the children have just loved it. They are going to take what they have done, revamp it and reuse it. And the teachers have grown professionally from using it (appendix H.2.a.xx).

4.10 Regional Professional Development

The researcher promoted the *ePortfolio Project* with senior education officers in the region by forwarding reports and raising the topic at district meetings of principals. He involved the Regional Professional Development Co-ordinator in refining the Professional Development Framework. He also spoke directly with the Executive Director (Schools) for the Toowoomba Education District about the potential of the framework for regional projects, and was invited to join the Regional Professional Development Committee.

In June, 2006 the researcher presented the framework at a meeting of facilitators from across the region. The PowerPoint presentation he presented at this meeting is summarised in appendix I.3. As part of the presentation, the researcher proposed ten principles of effective professional development (see Table 4.9) derived from his experience in the *ePortfolio* and *Success for Boys* projects and from his understanding of the contemporary literature.

Table 4.9: Ten Principles of Effective Professional Development

Feature		Characteristics
1. Content is integrated with other initiatives and practices	a.	Fits everything else; and
	b.	Balances individual and organisational needs.
2. The approach is systematic	a.	Is sustained; and
	b.	Responds to complex issues.
3. Teachers become researchers	a.	Stimulates intellectual development & professional conversation;
	b.	Motivates life-long learning; and
	c.	Encourages learners to be responsible for own learning.
4. Teachers become learners	a.	Requires time and effort;
	b.	Recognises differences & strengths; is flexible, has incentives; recognizes success; and guides and facilitates; and
	c.	Helps learners cope with new expectations.

5. Beliefs are challenged	a.	What is a teacher?
	b.	Conveys importance of new knowledge;
	c.	Asks what is and what could be? and
	d.	Includes the four sources of information that influence self-efficacy (observe, persuade, enact, & attend to affective states or see, hear, do, & care).
6. The focuses is on pedagogy	a.	Concerned with improving outcomes for students;
	b.	Demonstrates exemplary practice; and
	c.	Reflects on student work.
7. Learning is contextualized	a.	Relates to a real life context.
8. Learning involves the community of practice	a.	Is localized; and
	b.	Facilitates communication & collaboration.
9. Technology is used	a.	Improves productivity; and
	b.	Facilitates communication.
10. Learning is undertaken in a supportive school culture	a.	Is supported by school and district administrators;
	b.	Rewards risk takers;
	c.	Supports learners; and
	d.	Encourages willingness: to participate; to deprivatise practice; and to contribute to peer learning.

In June, 2006 the researcher also gave a presentation at a meeting of the Regional Professional Development Reference Committee, and the principles of his design were adopted to underpin the philosophy of the group to be communicated to all schools in the region.

4.11 Summary

The purpose of this chapter was to report the results of three projects in which a new approach to professional development for technology integration was first developed and then refined. Chapter five discusses the conclusions that can be drawn from these results.

As suggested in chapter three, the data set displayed in the appendixes is extensive and the challenge for the study was to make sense of that data. This challenge was complex because much of the data emanated from the perceptions and reflections of participants. For example, participants readily appreciated the importance of ePortfolios, but no data were offered that established a relationship between the implementation of ePortfolios and improved student outcomes (see section 4.3.1.3). The challenge was also complex because of the engineering of the “working environment” (Brown, 1992, p. 142) in order to apply the theory from the literature review in practical situations. That is, besides recording data the researcher was driving or engineering the projects on a day to day basis. While certain interpretations of phenomena were strengthened by the collection of data from multiple sources, the importance assigned to particular pieces of data was subjective and therefore had to pass the test of what can be reasonably concluded within the context. The potential value of those conclusions is enhanced by considering the expertise and experience of the participants and the researcher as described in the next chapter.

Chapter 5: Conclusions

This study investigated three research questions during the course of three professional development projects over a period of five years. The projects involved teachers and school administrators and their learning about the classroom implementation of ePortfolios, about improving the success of boys, and about innovative ways to apply ICTs in Mathematics. The research questions were concerned with responding to the issues surrounding the development of a quality professional development program for technology integration. Chapter one revealed the complexities involved in developing such a program because of the ill-structured nature of teaching and the multiple variables that need to be considered, coupled with the ever changing nature of technology and the uncertainty in defining exemplary teaching with technology. The response was to seek a new approach to professional development that was consistent with "new understandings of the nature of learning and knowing that collectively have been labelled 'situative'" (Hughes & Holmes, 2005, p. 309). This theoretical underpinning of a new approach to professional development was argued in chapter one to reflect the most potential in challenging teachers' beliefs, as well as creating a disturbance of mind to engage participants in their learning and for that learning to be reflected in practices. The focus of the situative perspective is to ground cognitive experiences in authentic activity (Duffy & Jonassen, 1992), to take into consideration the social and physical context of the learning, and to utilize communities of practice or networks of learners (Putnam & Borko, 2000).

The challenge in creating a new approach to professional development was to translate difficult concepts into a format that could be interpreted and applied in the field. This was necessary if the new approach was to be implemented by practitioners for practitioners and if teachers were to comprehend the instructional design so they could teach as they were taught. The translating of concepts into a usable model was a particular strength of the study as it was conducted by a serving principal who sought real world solutions to a real world problem. Furthermore, no single model or established theory consistent with the situative perspective addressed all of the elements required in a quality professional development program for technology integration. Therefore, the new approach had to seamlessly meld a number of theories that together would represent a system. The advantage of developing a learning system is that it transcends the traditional notion of a one-off workshop so that participants identify as a learner within a network of learners (Greeno & the Middle School Mathematics Through Applications Projects Group, 1998). There are powerful influences to be derived from a network of learners, particularly in a domain such as teaching because teachers are continuously seeking reaffirmation that they are teaching as teachers should (Ertmer, 1999). A system also provides a purpose and direction for activities. The system favoured from the situative perspective is a learning environment, and the addition of the word *constructivist* "is a way of emphasizing the importance of meaningful, authentic activities that help the learner to construct understandings and develop skills relevant to solving problems" (Wilson, 1995a, p. 30).

It became apparent that a constructivist learning environment as a stand alone system does not inherently include all of the necessary elements of a quality professional development program for technology integration, particularly in terms of the need to evaluate (a) the system; (b) the efficiency and effectiveness of attaining goals; and (c) the benefit to the organisation. It was therefore necessary to envelop the principles for developing a constructivist learning environment proposed by Jonassen (1999) within a larger framework. That framework needed to take into account other theories from the situative perspective to address issues raised in chapter one, as well as the deficiencies inherent in a constructivist learning environment in meeting the identified needs of the study. The composition and purpose of this framework in guiding the development of a constructivist learning environment appropriate for a professional development program for technology integration is reflected in the three research questions listed below:

1. What framework can be developed to guide the design and implementation of a constructivist learning environment to support the professional development of teachers and school administrators about ePortfolios?

2. How effective is a constructivist learning environment in supporting the professional development of teachers and school administrators about ePortfolios? and
3. Can the framework be applied in other projects to guide the design and implementation of a constructivist learning environment to support professional development?

This chapter begins by discussing the conclusions generated from the investigation of the research questions, particularly in terms of meeting the requirements of a quality professional development program for technology integration raised in chapter one. This is followed by a discussion about the issues addressed in the three projects, and about a list of ten proposed principles of effective professional development that were derived from the study. The chapter concludes by discussing features of the research, including limitations, significance, implications, and recommendations for further studies.

5.1 Research Question One

The investigation of research question one resulted in the Professional Development Framework in appendix B that guides the design and implementation of a constructivist learning environment. The development and refinement of the framework was rigorous. It was conceived in the *ePortfolio Project* involving over 400 participants across an education region and refined in the *Success for Boys Project* involving over 300 participants in two education districts. The content and format of the framework was reviewed by a Regional Professional Development Co-ordinator and a group of experienced school administrators who knew what they wanted in a professional development program. The framework was further scrutinised in the process of being published in a chapter of a book on professional development strategies in educational technology (Otto, 2008).

The framework consists of a series of questions that guides project leaders through the phases of planning, trialling, implementation, and institutionalisation. The phases and the questions within each phase provide structure and purpose to a professional development project. The study concludes that this systematic and sustained approach is essential in a quality professional development program for technology integration. Chapter one describes the complex issues involved in teaching and the multiplicity of effects that need to be accounted for in professional development of this nature. The framework is a way of making sense of a complex process, and draws together all of the component elements of a constructivist learning environment to create a single system.

The Professional Development Framework has two versions, one for project leaders, planning committees, or facilitators (see appendix B.1), and the other for project participants (see appendix B.3). The Participant Action Plan encourages participants to take responsibility for their learning, and provides a format for them to plan their learning. This scaffolding of the social and participatory aspects of learning is considered by McLoughlin and Luca (2000) to be critical to meeting expectations that individuals, even professionals, will assume independent self-regulated learning. Technology has a role in this process by facilitating communication between participants and between participants and facilitators, e.g., the email discussion list in the *ePortfolio Project*. The Participant Action Plan also reminds participants about the instructional design of their learning to encourage them to teach as they are taught.

Specific questions in the framework ask project planners to consider strategies to sustain the professional learning and the changes in practice. A sustained project will garner participant confidence in the value of the project, whereas one-off workshops and short lived projects are likely to imbue teachers and school administrators with a sense of never ending change and change for change sake that devalues the learning derived from such projects. The framework, on the other hand, encourages participants to thoroughly investigate an issue and generate practices that are tested within a context. These new practices should have a greater probability of being accepted as everyday practice and included in participants’ beliefs about what constitutes exemplary teaching. Furthermore, projects need to be sustained in order to develop the range of skills needed in technology integration. This factor was enhanced in the *ePortfolio Project* by establishing clear links between the uses of technology in the classroom and using technology in the home and for recreation.

The framework focuses attention on evaluating the learning environment, the learning process, and the learning outcome in order to address shortcomings that Bain (1999) described in university projects. The framework guides project planners in gathering the information necessary to evaluate a project, in particular its efficiency and effectiveness in terms of the gains in teacher knowledge and skills and the application of that knowledge and those skills. As reported in the *ePortfolio Project*, information relating to the first phase was continually gathered and taken into account during the life of the project. Early assumptions about the beliefs of learners had to be modified as more became known, for example, about their commitment and capacity for perseverance. Data collection processes in the framework look beyond the evaluation of discrete activities such as workshops, although this did occur in the *ePortfolio* and *Success for Boys Projects*. That is, it is important to investigate participants' perspectives about the presentation of a workshop so that changes can be made to make the learning experiences more satisfying. However, it is important that evaluation does not stop at that point, and as proposed in the framework, attention needs to be directed towards the evaluation of learning outcomes, the impact of learning outcomes on practices, the effectiveness and efficiency of the project as a system, and the benefits to the organisation. Furthermore, the framework asks project planners to evaluate the methods of evaluation. That is, questions ask if the assessment of activities and the assessment of learning outcomes are workable and what changes need to be made.

Project planners are encouraged to collect diverse types of information from diverse sources to reflect the purpose for which it is to be used. For example, quantitative or objective data are collected in analysing the importance of the issue while qualitative or subjective data are collected to derive an understanding of participants' beliefs. The recommendations for the collection of data provided in the *Success for Boys Project* are a comprehensive guide in this regard for teachers and school administrators (see appendix G.4.f-i). For example, it is recommended that student achievement is assessed over time to determine the effectiveness of intervention strategies, and sources of data are proposed along with guides for analysing and reporting the data.

The evaluation of student outcomes as a result of their teachers' participation in professional development is not direct but certainly implied. A modification of the framework might include after the question "will the learning outcomes have the desired effect on practices?" the further question "have the changes in practices had the desired effect on student outcomes?" In the *ePortfolio Project*, rich information about the improved outcomes for students was derived from the presentation by participants of their work as cases.

The framework supports district and school leaders in initiating and managing professional development projects in response to issues. For example, the Facilitators' Plan was used by the planning committee representing a cluster of schools in order to generate activities associated with the *Success for Boys Project*. The same planning format was used by planning committees in schools to generate responses at the school level that were context specific. The Participant Action Plan was used by individual members of the school staff to plan their own learning and responses. Furthermore, the framework supports the six roles of school administrators discussed in section 2.7.2. For example, by investigating the importance of the issue, the data relating to the issue, the new practices, and how the new practices fit the context, school administrators gain an insight into the problem at hand and a vision of how their schools might function differently. The questions relating to tools require school administrators to consider how technology and other resources might be used more effectively. The questions relating to the learners, their beliefs, skills, and experiences encourage school administrators to develop a better understanding of their staff and their needs and interests, and to adopt a systematic approach to addressing those needs and interests.

Planned activities take account all three types of knowledge proposed by McLoughlin and Luca (2000), namely propositional, process, and personal knowledge. For example, in the *ePortfolio Project*, teachers planned projects using the software *Inspiration*, they acquired and shared information about ePortfolio implementation, and they self-evaluated and interpreted experiences during the presentation of their work as cases. Planned activities also take into account the four sources of information that influence self-efficacy proposed by Bandura (1986). It was concluded that teachers need to have confidence that the changes they make in their practices will make a difference, and that teacher confidence can be improved if activities include the following:

1. *Seeing*: observing others perform the practice;
2. *Hearing*: persuading the learner how and why the new practice will make a difference;
3. *Doing*: enacting the practice themselves with meta-cognitive reflections and modifications; and
4. *Caring*: attending to the affective needs of the learner (comfort, feelings) (appendix B.3.c).

These terms are a simplification of those used by Bandura (1986) to aid understanding by project planners, as well as to aid memorization by participants when they transfer their learning to their teaching.

The presentation of cases of participants' achievements in the *ePortfolio Project* served to promote collaboration and dispel concerns that teaching was practised behind closed doors (DEST, 2001). Similarly, the identification and use of local experts to present workshop sessions was also seen as teachers collaborating and sharing their work with other teachers. The added benefit is that these services were volunteered, which contributed markedly to the efficiency of the project. Part of the funding for the *Success for Boys Project* was to be directed towards paying workshop presenters. The project planning committee saved this money by using volunteer presenters and allocated the money instead to school based projects. Again, participants related well to the presenters. They knew the presenters and they knew the presenters knew their context and the problems they were facing. Participants who facilitated sessions grew confident that what they were doing was accepted by their peers. Their innovativeness, openness to change, enthusiasm about addressing the issue, and their willingness to share what they had learned was infectious and motivating for others.

The framework focuses attention on participant beliefs at the beginning of a project and effective strategies to challenge those beliefs, and evaluates how changes in beliefs are translated into actions or practices. In order to challenge participants' beliefs, the framework sets out a series of logical questions that first investigate existing beliefs, second develop an understanding of the new beliefs and practices being promoted, and third plan activities to expose participants to those new beliefs and practices. Furthermore, the framework links the challenging of beliefs and learning to action in a specific context. For example, in the *ePortfolio Project*, participants saw the new practices in action during the presentation of cases at the workshops, and they were encouraged to enact the new practices and then take the next step of presenting their work as a case. They were involved in hands on skill development sessions, and they were invited to attend sessions called an *ePortfolio Playground* where they could work on their ePortfolios with peer and expert support. During the workshops, participants were encouraged to take the first step, which was purposely kept simple. That is, all they had to do was to have their students use technology to create an artefact and save that artefact to a directory on the computer or server. The stages of development of ePortfolio implementation demonstrated how this step could be followed by another and then another at a pace determined by the individual.

The benefits to the organisation of the *ePortfolio Project* included the development of participant knowledge and skills in the use of technology, the utilisation of expensive technology resources, the establishment of a learning network and enhanced collaboration among teachers and school administrators, and the achievement of various systemic priorities. The organisation also benefited from having extensive, highly effective and efficient professional development organised and facilitated by salaried employees with minimal outlay in terms of additional cost and human resources. As an example of a school-based or in-house professional development program, the *ePortfolio Project* was sustained for over three years and received around $A25 000 for approximately 400 participants, and would have been equally as effective with no funding at all. On the other hand, the *ICTs in Mathematics Project* is an example of a project initiated by the education organisation. This project was only sustained for one school term of 10 weeks and cost a great deal more with $A23 760 (48 participants x 1.5 days x $330) to release participants from their normal classroom duties, and $A3 300 to pay for the co-ordinator.

5.1.1 Issues with the Professional Development Framework

Responding to each of the questions in the Facilitators' and Participant Action Plans that make up the Professional Development Framework represents an investment of time that busy teachers and school administrators might find daunting. They might simply not appreciate the necessity for such thoroughness. There is no easy solution to this issue other than developing awareness that the amount of planning involved in a project is likely to be reflected in the quality of the outcomes. This applies to the implementation of the framework or any other systematic approach to professional development. Educators should recognise this principle because it applies to most aspects of teaching, including the planning of lessons or the development and implementation of school policy. There is a message in this principle for administrators of schools, districts, and regions, and for those who make decisions at higher levels in an education organisation. First, a single project that is implemented thoroughly and sustained is likely to have better outcomes than a number of short term projects that are ill prepared or are not context specific. Second, the change expected in schools needs to be planned instead of being ad hoc or continuously imposed as a reaction to the environment. Because the *ePortfolio Project* was planned and sustained, it was able to respond to many issues currently faced by schools, even though the topic appeared at first glance to be just about ePortfolios. For example, teachers developed their own technology skills and the skills of their students; they worked collaboratively and shared their work with others; they engaged students who had previously been disengaged; they were innovative; and they gravitated towards a student centred approach to teaching.

Besides improving outcomes, those making decisions about professional development projects need to be aware that an investment in time has the potential to save time. For example, the co-ordinator of the *ICTs in Mathematics Project* relates how her investment in time in setting up the project room and gathering and organising information saved participants considerable time in locating those resources at the point in time when they were needed the most. The importance of the last point should not be underestimated, i.e., the value of information is enhanced if it is available at the moment of learning that occurs while a person is solving a real world problem.

The issue of time appeared to be not so problematic when participants were involved in a project on a voluntary basis. The professionalism and passion that teachers and school administrators have for working with children is exemplified in the interview with the co-ordinator of the *ICTs in Mathematics Project* (see appendix H.2). This person was a participant in the *ePortfolio Project* and she applied the experience she gained in constructivist learning environments as a learner to adopting this instructional design as a facilitator. The advantage of the framework is that it funnels that passion by giving it direction and purpose and by making sense of complex issues. Questions in the framework do attempt to engender the same enthusiasm in those who have not volunteered for a project by highlighting the importance of the issue and considering strategies to engage all participants. However, it is ultimately the skill of the project planners to elicit the co-operation of reluctant participants and the responsibility of all educators as professionals to partake in professional development that leads to improved outcomes for students.

5.2 Research Question Two

This research question was investigated during the course of the *ePortfolio Project* and the *ICTs in Mathematics Project*. The Professional Development Framework was not applied in the *ICTs in Mathematics Project*, but this was an opportunity to simply focus on a constructivist learning environment. In consultation with the researcher, the co-ordinator applied her experiences in the *ePortfolio Project* to adapt the five elements of a constructivist learning environment to the design of an online project room. This was similar to the design of the CD-ROM distributed during the *ePortfolio Project* as a stand alone professional development program. While the co-ordinator appreciated the convenience of designing the *ICTs in Mathematics* project room in this way as described in section 5.1.1, she had to look elsewhere for guides to evaluate the project. This evaluation process would have been part of the project if the framework was used.

The concept of a constructivist learning environment attends to the three themes of the situative perspective identified by Putnam and Borko (2000):

1. The physical and social contexts in which an activity takes place are an integral part of the activity, and that the activity is an integral part of the learning that takes place within it;
2. Interactions with the people in one's environment are major determinants of both what is learned and how learning takes place; and
3. The distribution of cognition across people and tools [makes it possible] to accomplish cognitive tasks beyond the capability of any individual member (pp. 4-5).

Furthermore, each of the elements of a constructivist learning environment addresses one or more of the concepts discussed in chapter two. For example, developing an understanding of the issue invites project planners to consider the characteristics of participants as learners. That is, activities would be designed differently if participants were experienced teachers than if they were beginning teachers. The element *related cases* facilitates metacognition because participants have to reflect on their learning and their practices in preparing their presentations, and participants reflect on their own practices as they view the presentations. The role and structure of story in the everyday lives of practitioners as described by Orr (1996) was also apparent in the presentation of cases. For example, participants would describe the context in minimal detail assuming their peers would be familiar with their situation; the cases preserved and circulated information that was the result of hard work; participants amused their peers with their stories; and the stories originated in problematic situations. Participants recalled cases as part of the case-based reasoning process in resolving problems in their own implementation of ePortfolios, which was further supported by accessing information resources. Consideration of the development of skills in the use of associated tools was important in both the *ePortfolio* and *ICTs in Mathematics Projects*. Access to social and contextual support proved to be a critical element when participants were faced with the reality of implementing difficult tasks in a complex environment.

The comments by the facilitator of the *ICTs in Mathematics Project* are worth noting, as they reflect the opinion of someone who has applied the principles recommended in this study to develop a constructivist learning environment (see appendix H.2). The researcher had input at the beginning of the design process, but the facilitator generally worked independently in managing the project. The facilitator verifies some conclusions drawn from the two other projects reported in this study. For example, she recognised that taking the time to carefully plan and design the project ultimately saved time and contributed to its effectiveness (appendix H.2.a.vii, x). That is, participants saved time by knowing where to find what they needed and by accessing information resources and guides in the use of tools. She recognised the importance of all of the elements of the constructivist learning environment, including social and contextual support (appendix H.2.a.xiv). The elements represent nothing more than what effective facilitators what do intuitively. However, the principles provide a plan and a checklist to ensure that every aspect is covered, as well as providing a theoretical underpinning for the project. The facilitator responded to the complexity of ICTs in Mathematics in a way that was similar to the researcher in the *ePortfolio Project.* That is, when participants felt overwhelmed she sought simple explanations and simple ideas that the participants had not previously considered, and directed their attention toward implementing ICTs in stages (appendix H.2.a.xiv). That is, participants should develop confidence in simple applications to form a knowledge and skill base for more complex applications. The facilitator also recognised the importance of understanding the learner and to not make assumptions about their capabilities.

Two final points that can be derived from the interview with the facilitator are central to themes expressed in throughout this report. The first is that teachers are motivated to be involved in professional development by their perceptions of benefit to children. The interview reflected the passion the facilitator has for working with children, and the effort that she is willing to invest if she is able to develop her own effectiveness and the effectiveness of others (appendix H.2.a.xx). The second point is that teachers who participated in the projects were expected to teach as they were taught. The interview with the facilitator demonstrates that teachers can understand the principles of a constructivist learning environment and that they can apply the principles to design projects (appendix H.2.a.ii).

The elements and principles of a constructivist learning environment (see Table 2.1) proved to be versatile in the design of learning experiences. A constructivist learning environment can be designed, implemented, and sustained over a number of years, as was the case with the *ePortfolio Project*. On the other hand, the researcher was able to apply the same elements and principles in a 60-90 minute workshop presentation. Most importantly, teachers were taught in the same way they should teach. That is, teachers were continually reminded about the five elements of a constructivist learning environment and provided with examples about how the elements had been employed in the *ePortfolio Project* and how they could employ the elements in a classroom project. The researcher related how he referred to the elements as a checklist when evaluating and providing suggestions about classroom projects.

5.3 Research Question Three

This research question was investigated during the course of the *Success for Boys Project*. The project was initiated by the principal of a large high school and the researcher assumed the role of research manager. The *Success for Boys Program* is an initiative of the Australian Government in response to the under achievement of boys. The program was released with a set of recommended instructional strategies and resources relating to the issue. The Professional Development Framework not only met the requirements of the recommended strategies, but also added new strategies to enhance the effectiveness of the program. Implementing this program as a district project no doubt influenced this study, and it also confirmed the importance of aspects of the framework and the importance of the framework in developing a learning system.

The project highlighted the role of a whole school approach in facilitating change. It was expected in the *ePortfolio Project* that innovative teachers would implement ePortfolios and their initiative and example would influence other teachers. The whole school implementation of ePortfolios would be achieved when a critical mass of teachers within a school had implemented ePortfolios and those who had not felt pressured to at least make a start. Different schools approached implementation in different ways. In some schools, the implementation of ePortfolios was the initiative of a few individual teachers with little input from school administrators; in other schools a school administrator was visibly supporting a group of teachers while they implemented ePortfolios; and at the small school of Helidon the principal made the decision to begin the implementation of ePortfolios as a whole school project. Because one of the strategies in the *Success for Boys Project* was to take a whole school approach to the issue, school administrators were expected to adopt the Helidon model. That is, school administrators were expected to take an active leadership role and involve all members of a school staff regardless of whether they were motivated by the issue or not. Applied appropriately, the framework has a structure that is able to respond to this situation. That is, school based project planners need to carefully consider the questions in the framework relating to the beliefs of the participants, why the issue is important, and how participants will be engaged in the issue. This was not as problematic in the *ePortfolio Project* because participants indicated their enthusiasm for the issue by volunteering their time to attend workshops. The resource *Planning a Whole School Project* (appendix G.4) was developed specifically to support school administrators in addressing this problem and could be used as an adjunct to the framework, although it does repeat some of the principles listed in the information that accompanies the framework.

Project planners at the school and district level were able to use the resources supplied with the *Success for Boys Program* to respond to questions in the framework. For example, useful information was provided about the issue, the importance of the issue, new practices, and cases of implementation of those practices. The advantage of applying the framework as the planning template is that it is systematic, logical, and easy to follow; it is consistent with established theory; the same template can be used for different projects; and it draws the attention of planners towards important aspects of professional development. For example, the *Success for Boys Program* provides cases as examples of how teachers have responded to the issue. The framework enhances the potential of those cases, as they could be used as seed cases in a library of related cases. Other cases developed locally or elsewhere could be added to the library to support case-based reasoning. The other benefit of a case library is to enhance cognitive flexibility by providing representations of "the same information in different contexts and from different perspectives" (Spiro & Jehng, 1990, p. 165).

Although the framework was developed in a professional development project focusing on technology integration, there is nothing in the framework that relates specifically to technology integration. That is, there is nothing in the framework that would preclude it from being applied to other professional development projects. The framework is probably more rigorous and robust because of its origins, as technology integration adds a degree of complexity to professional development. For example, participants had to spend considerable time in becoming familiar with the tools associated with ePortfolios before they could even consider implementation. Information about the tools had to be continually updated during the project because new tools became available, the price of the tools generally became cheaper, and facilitators and participants uncovered new applications for tools.

A difficulty shared by both the *ePortfolio* and *Success for Boys Projects* concerns the resilience and persistence of participants, when at some point the implementation of new practices inevitably becomes difficult, e.g., a planned strategy does not work or teachers become overwhelmed. This difficulty reflects the nature and complexity of teaching discussed in chapter one, and the need for teachers to adjust their repertoire in the midst of action (Schmidt, 2000). The question to be asked is whether the framework is effective in addressing this issue, and the answer is that sections of the framework are specifically included for this purpose as listed below:

1. The professional development project is planned in detail;
2. The context of participants is taken into account;
3. The impact of the new practices is taken into account;
4. Learning is linked to action through access to cases, the presentation of cases, and the development of skills in the use of tools;
5. Collaborative and contextual support is considered and provided;
6. Activities reflect the four sources of information that influence self-efficacy;
7. The appropriateness of activities is evaluated;
8. The changes in the project necessary to sustain learning are considered so that participants who encounter difficulties continue to develop new skills and new strategies; and
9. The changes in the project necessary to sustain new practices are considered as a mechanism to respond to the difficulties faced during implementation.

5.4 Conclusions about the Topics of the Projects

Each of the topics addressed in the projects had inherent characteristics that contributed to the nature and content of the final version of the Professional Development Framework. It is indicative of the versatility of the framework and the concept of a constructivist learning environment that they could be applied to such diverse topics.

5.4.1 ePortfolios

The theme of ePortfolios was powerful and no doubt contributed to the success of the project. It is a simple concept and when explained to teachers they immediately envisioned how ePortfolios could be a focal point for all activity in their classrooms, and provide a purpose for their involvement with technology. The simplicity of the concept reduced potential participant feelings of being overwhelmed, and allowed professional development to focus systematically on the associated information and skills that together realize the vision that each participant had for ePortfolios.

Participants in the *ePortfolio Project* had high expectations of ePortfolios as reported in the reflections of school and district leaders in appendixes d.12-15. A tribute to the concept of ePortfolios is that during the course of the project not one participant expressed an opinion that their expectations were not met. This includes participants who have implemented ePortfolios in their classrooms and schools for at least five years. Although many systemic priorities and initiatives have been and gone in that time, ePortfolios continue to be of interest to teachers as a learning tool. For example, outcomes education as a systemic initiative only survived the first few years of the project and was replaced by learning essentials, with no adaptation required in the implementation of ePortfolios. Besides being compatible with systemic priorities, ePortfolios encourage a focus on authentic pedagogy and assessment and the authentic use of tools. Most importantly the implementation of ePortfolios has a futures perspective. Furthermore, indirect consequences such as an enhanced relationship between schools and their communities complement the direct consequences perceived by teachers and school administrators of engaging students and improving outcomes.

There are some important considerations to be addressed before implementing ePortfolios. Teachers and school administrators need to understand the three types of ePortfolios and the implications of implementing each type. The teacher at Withcott State School who reflected on her work with ePortfolios to gain her ICT Pedagogical Licence (appendix F.11.D) is an example of a good understanding of the types of ePortfolios. She perceived a purpose for each type and planned her ePortfolios accordingly. Attention to planning and thinking through the implementation of ePortfolios extends to the structure of directories and sub-directories where students will store the artefacts of their ePortfolios. Changing the names of directories may sever links to PowerPoint presentations and web sites. The software *Inspiration* is a useful tool in designing the relationship between directories with students, and in communicating the design (see Figure F.10).

The stages of development of ePortfolios also contribute to the vision participants have for ePortfolios in their classrooms and offset potential feelings of being overwhelmed. That is, a simple and manageable initial implementation of this new concept can develop into more complex applications. Another inherent characteristic of ePortfolios is that it is context specific. By participating in the project, teachers and school administrators developed an understanding of the concept, accessed contemporary literature about its potential benefits, observed cases of implementation, and developed the requisite skills. However, the implementation of ePortfolios in their classrooms and schools required considerable problem solving to match strategies and practices with resources, purposes, and the needs and capabilities of students. This is an example of case-based reasoning in action. Teachers and school administrators access cases to guide their solutions to a new problem, trial their solutions and either modify their solutions or present their solutions as a new case. This represents a new way of thinking for many participants, who sought templates of ePortfolio implementation and complete packages of practices to adopt. This also highlights the need for teachers and school administrators to become researchers in order to tailor responses to their context, rather than simply accepting ready made universal solutions.

5.4.2 Success for Boys

Improving the success of boys is an example of an issue that demanded highly contextualised professional development. Activities and resources in the project were directed towards developing knowledge and skills so that members of a school staff could undertake their own research and development. It is also an example of professional development that needs to be taken on board by all members of staff in order to generate strategies that are “owned” by that staff and that are applied consistently across the whole school. This issue has the potential to unify a school, including administrative, teaching, and ancillary staff. However, reaching a consensus about strategies is not as easy as one would think. There will be those who seek to enforce immediate and short term reactions to boys’ behaviour such as detention or suspension, and others who are prepared to invest the time to investigate and respond to root causes. Furthermore, the program has to involve participation by those who would normally volunteer for professional development of this type and those who would not normally volunteer. One motivating factor is that the under achievement of boys is often linked to their behaviour and consequently this issue affects everyone. Nevertheless, effective outcomes will depend on the skill of school administrators in highlighting the seriousness of the issue, on their dedication to the recommended process of researching, generating, and trialling responses, on their ability to engender staff unity and consensus, and on their capacity to sustain a school based project. The Professional Development Framework provided a structure for these actions to occur.

5.4.3 ICTs for Mathematics

An underlying goal of this study was to present complex theory in a way that it can be readily understood and applied by practitioners. Without studies that can achieve this goal, theory remains exactly that, theory. The application of theory must also be seen to make practice easier in the long term, and not harder. The co-ordinator of the *ICTs in Mathematics Project* reports her enthusiasm about constructivist learning environments because it simply made so much sense to her, and that it saved her and the participants so much time. By organising the online project room according to the elements of a constructivist learning environment, she had a place to upload all of the resources that she had collected as co-ordinator and participants had submitted. This included information and data about the importance of the issue, information resources, related cases, guides in the use of tools, and access to contextual and social support, e.g., a discussion forum. She could refer participants to the relevant section so they access resources at the time they were needed most, during real world problem solving.

This is an example of a project in which the constructivist learning environment provided a shell for the learning to take place, and then participants taking responsibly for their own learning. Participants are motivated to do so because of their interest in the topic and their vision of how their learning will improve outcomes for their students. This project also exemplifies the relationships proposed in Figure 2.1 of the constructivist learning environment serving to facilitate interaction between, on one hand, the lived experience of participants within a context and as members of a community of practice and, on the other hand, stored knowledge, which includes issue representation, information resources, and related cases. Another theme that was highlighted in this project was the use made of cases of ICTs in Mathematics developed by participants and their contribution to the memory of the organisation. Too often, the teaching strategies developed in an expensive professional project are adopted only by the participants who developed them, and there is no mechanism within the instructional design of the project to share those strategies with others. Again, the concept of stored knowledge in Figure 2.1 and related cases in a constructivist learning environment suggest a need for project co-ordinators to consider the further and future use that can be made of new and potentially valuable knowledge that is created by participants during the course of a project.

5.5 Principles of Effective Professional Development

As mentioned in chapter four, the researcher presented a session on the Professional Development Framework at a meeting of project facilitators from across the region. As part of the presentation, the researcher proposed ten principles that are likely to improve the effectiveness of professional development for technology integration. The principles are derived from an understanding of the literature, experiences in the field components of this study and a previous study (Otto, 2003), and 30 years experience as a school principal participating in and initiating professional development.

5.5.1 Principle 1: Content is Integrated with other Initiatives and Practices.

The content of effective professional development is integrated with other initiatives and practices. For example, the *ePortfolio Project* addressed a range of systemic priorities even though the implementation of ePortfolios itself was not a systemic priority (appendix D.3.d). The project assisted schools to address the key action areas of the Middle Phase of Schooling by providing rich, in-depth assessment information, promoting a higher level of engagement and deeper understanding, and improving continuity of information exchange and pedagogy from years seven to eight. The project supported the goals of the new outcomes based curriculum, utilized and developed existing resources and teacher and student skills, and promoted commitment to improvement through innovation. A focus on a single theme in this way assists teachers to make sense of complex issues and to cope with continuous change.

The *ePortfolio Project* was an example of professional development that balanced the needs of the organisation and the individual. Individuals participated in the project because they recognised the need to develop their personal knowledge and skills in order to implement ePortfolios and improve student outcomes. The needs of the organisation were apparent and communicated to participants, but those needs did not drive or dominate learning experiences. This an example of “bottom up” professional development or what Borthwick and Pierson (2008) refer to as professional development generated by in-house leadership. The value of such an approach is reflected in the commitment of participants enhanced by the personal relevance of the learning, and the flexibility in the design of the learning so that it meets the needs of serving teachers.

5.5.2 Principle 2: The Approach is Systematic

While the attention to detail in the Professional Development Framework may be problematic in the time taken to plan and evaluate a project, the systematic nature of this approach ensures that all of the relevant variables and factors are considered. This is particularly important in designing professional development for complex issues such as those encountered in teaching and technology integration. A systematic approach is also more likely to sustain a professional development project. Change cannot be hurried and developing understanding takes time (Hannafin & Land, 1997). In the *ePortfolio Project*, teachers required more than two years to experiment with ePortfolios and to be comfortable with the technology. By persevering with early adopters until they become confident with the new practices, a critical mass of learners can be developed who will take a good idea through to accepted practice in a school or district. The researcher had first hand experience with this phenomenon at his own school. Even with a highly motivating topic such as ePortfolios, the challenge for the project planning committee was to sustain teacher engagement when initial enthusiasm had to be translated into the hard work of implementation. It is reasonable to suggest that teachers are likely to persevere to overcome obstacles if they are engaged in an issue important to them and their early enthusiasm is nurtured and supported. This was achieved by demonstrating that everyone had the capacity to learn technology skills and that ePortfolios can be implemented in stages. Skill development was linked to a teacher’s personal use of technology and care was taken not to overwhelm teachers. For example, the simplicity of modern *plug and play* applications was demonstrated at workshops and elective sessions were arranged to ensure that something was gained by participants of all skill levels.

5.5.3 Principle 3: Teachers become Researchers

Effective professional development encourages teachers and school administrators to undertake their own research into an issue. The advent of the Internet allows this research to be conducted from the classroom or home, which has become a common practice. For example, the researcher recently observed two teachers undertake a *Google* search to develop their understanding of a new issue and to investigate potential strategies. One teacher had a new student with a medical issue, Tourette’s syndrome, and the other teacher had a student who was diagnosed with a learning issue, namely poor working memory. Research undertaken in this manner is likely to be more personally relevant to participants than information that is merely provided. Furthermore, it will stimulate intellectual development and contribute to professional conversation. Teachers and school administrators who research issues and recognise the benefits of undertaking their own research are life-long learners. These individuals seek new answers to old problems, and are likely to challenge assumptions that have built up around practices. These individuals are also likely to take responsibility for their own learning. The *ePortfolio Project* provided participants with a lot of information derived from the literature review and cases of practices derived from participants' experiences. The information and cases were intended as a starting point and that participants would seek further information they needed for their context and to experiment with practices in their own classrooms.

5.5.4 Principle 4: Teachers become Learners

Effective professional development encourages teachers to identify as learners. The *ePortfolio Project* provided opportunities for participants to slip in and out of the roles of learners and teachers, i.e., facilitators. The principle established in these opportunities was apparent to participants in that we should allow students to also take on these dual roles. Facilitating a session, either by a teacher, a school administrator, or a student is a powerful learning process. A facilitator has to understand what it is they are teaching, reflect on its purpose, consider alternate strategies, and present it in a way that will be meaningful to others. This is relevant in this study because from the constructivist perspective learning is perceived to be "a process of meaning making" (Jonassen & Land, 2000, p. v), and is even more relevant when it is understood that meaning making is "resolving the dissonance between what we know for sure and what we perceive or what we believe that others know" (Jonassen & Land, 2000, p. vi). Negotiating meaning is an integral part of facilitating a workshop session. That is, facilitators consider what they know and what they assume participants know. Facilitators adjust their assumptions about what participants know according to responses by participants during the session, and confirm during those interactions if what they as facilitators know is accepted by others, particularly peers, as reasonable. In hindsight, facilitators could have been interviewed in this study to confirm and further understand this phenomena and it could be a topic for further study.

Being a learner requires busy teachers and school administrators to invest time and effort. However, the advantage is that it helps them to cope with new expectations. For example, the *ePortfolio Project* appeared to involve learning about aspects of teaching that are different and separate from the normal practice of teaching. In fact, the implementation of ePortfolios represents an approach that simply encapsulates all classroom activity and allows teachers to make sense of the new technologies. As mentioned several times previously, teachers who were involved in the *ePortfolio Project* were simultaneously working towards achieving numerous systemic priorities including gaining their ICT Pedagogy Licence, and were actually saving time in the long term.

Understanding the characteristics and needs of teachers and school administrators as learners as proposed in the Professional Development Framework impacts on approaches to the delivery or facilitation of their learning. This understanding will recognise differences between these participants and participants of other professional development projects, and differences between individual participants. For example, the *ePortfolio Project* included teachers and school administrators and the experience of participants varied. This understanding will also recognise the strengths of participants to build on further learning, and the areas in which development is required. Jonassen (1993) suggests that participants who are taking on a new learning regime may need to develop study skills and require time to adjust to a new approach to professional development. He further suggests that participants may not necessarily have the skills to undertake reflection in deep and meaningful ways. Again, the planning of activities needs to be flexible, and facilitators need to be flexible during a session if the learning is not meeting the needs of participants. To achieve a sustained project it is necessary to ensure that participants continue to want to come to future workshops. Participants may be influenced to continue their involvement by incentives and recognition of their successes. Most importantly, participants must be guided in their learning and sessions facilitated in keeping with the nature of the learning, the participants, and the goal of having teachers teach as they are taught.

5.5.5 Principle 5: Beliefs are Challenged

Effective professional development challenges participants' beliefs so they redefine previous conceptions about what is exemplary teaching. The framework guides project planners in challenging beliefs by addressing each of these questions:

1. What is a teacher?
2. What is exemplary pedagogy?
3. How important is the new knowledge?
4. What is and what could be? and
5. How should the four sources of information to influence self-efficacy, i.e., observe, persuade, enact and attend to affective states (see, hear, do, and care) be addressed in activities?

The *ePortfolio Project* appeared to achieve this goal for the following reasons. ePortfolios were presented not as an add on, which often occurs with educational technology (Meredyth et al., 1999), but as an approach that integrates technology into every aspect of classroom activity. The implementation of ePortfolios is a simple concept and appeared to make sense to participants. That is, it appeared to be an obvious and logical progression for technology in schools. The presentation of cases reinforced these notions because participants could *observe* the new practices and *be persuaded* about their benefits. These two sources of information were supported by the other two sources of information that influence self-efficacy as proposed by Bandura (1997). Participants accessed hands on sessions and were provided with strategies such as the stages of development of ePortfolios to facilitate *enactment* of the new practices. Attention was given to the *affective state* of participants by careful organisation of workshops and the provision of social and contextual support. Furthermore, the cases were presented by respected local practitioners, whom the participants knew would not be involved in ePortfolios unless it was a valued undertaking with the potential to improve student outcomes.

5.5.6 Principle 6: The Focus is on Pedagogy

Guskey (2000) suggests in Figure 1.2 that if teachers participate in effective professional development and change their teaching practices, they will observe changes in student learning which in turn will change their attitudes and beliefs about teaching. A feature of the data from the *ePortfolio Project* is that teachers and school administrators were motivated according to their beliefs about what is in the best interests for children. That is, while the potential for ePortfolios was recognized immediately and while there was appreciation of the need to adopt new pedagogies, teachers balance old practices and new practices based on what they believe serves the interests of children. There was no onus on participants to give up their time to become involved in ePortfolios because it was not part of the mandated curriculum, but they were excited about the potential of the concept to improve teaching and learning. They were aware of the need to use technology in their teaching, and ePortfolios provided a framework for this to be achieved. Participants understood that the implementation of ePortfolio occurs in stages as teachers and students gain skills and confidence. However, the power of technology meant that even small changes in practices could be celebrated. For example, one of the ePortfolios demonstrated by the researcher during all-in-one sessions was simply a series of videos taken over eight months of a child in year one reading a book while the teacher completed a running record. Participants were familiar with the scenario of a running record because it is a common practice, but they were astounded by the additional information that was provided by the videos. The student was facing the camera and they could follow his eye movements as he sought clues to decipher words. In the first video, the child knew some words as sight words and sounded out the letters of other words. In the final video he was reading fluently. While this particular example did not contribute a great deal in directly improving the child's reading ability, the collapsing of time facilitated by the videos gave participants an insight into the outcomes of their teaching of literacy. That is, they could identify skills that had been taught to this student and could see how the accumulation of those skills eventually leads to fluent reading. As suggested by Guskey (2001) in Figure 1.2, this display of student work and achievement allowed the group to reflect on the practices that led to those achievements, and to further reflect on how learning during the project could contribute to those practices. Furthermore, the practices displayed in the videos were exemplary practices, and demonstrated a level of practice that participants might aspire to achieve.

5.5.7 Principle 7: Learning is Contextualized

Effective professional development is contextualized in that new practices are consistent with the world outside the classroom, and that participants are encouraged to adapt practices to meet the needs of their context. The *ePortfolio Project* responded positively to both these factors. There were strong links between ePortfolios as a concept and with creating ePortfolios for recreation purposes, as well as with creating ePortfolios to present one's abilities in order to seek new positions in the workplace. There were also strong links between the technology associated with creating ePortfolios and the technology that is used in the home and workplace. Encouraging participants to adapt practices to meet the needs of their context limits the use that can be made of templates, even though some participants sought templates in the *ePortfolio Project* as a ready made solution to the issue of implementation. Similarly, intervention strategies in the *Success for Boys Project* had to be generated at the school level in order to be effective, and the role of the project planners was to empower members of each school staff with the skills and processes for this to be achieved. One advantage to be gained is that participants develop ownership of the new practices and a personal interest in enacting those practices. Another advantage is that the new practices are more likely to reflect the interests, needs, attitudes, and beliefs of students and teachers, to build on previous knowledge and experiences, to utilise local resources, and to take into account cultural aspects of the environment.

5.5.8 Principle 8: Learning Involves the Community of Practice

A community of practice may be seen as merely providing a convenient means of facilitating communication about new practices and events and providing collaboration and support. However, the implications of a community of practice are more complex and far reaching. For example, a community of practice is effective when it is localised. In the *ePortfolio Project*, local expert teachers and school administrators and participants who implemented ePortfolios were invited to present sessions. This overcomes any notion that the professional development is being imposed from outside the local area, or in the case of the *ePortfolio Project*, as being imposed by the education system. Rather, it is a series of events and activities being generated from within and about which we have control in meeting our specific needs. Section 5.5.4 discusses the importance of participants identifying as learners, and it is even more important they identify as belonging to a network of learners. The name of the network of learners in the *ePortfolio Project* continually changed. Initially the name reflected the nature of the project and the locality of participants, until the project grew to a size that it simply became known as the *ePortfolio Alliance*. Participants continued to recognise this community of practice as being a local initiative and participant identity with the network was strong, to the point one could almost say they viewed it as a "badge of honour." Participants and facilitators were aware they were contributing something unique, innovative, and exciting to their school and district, and to education in general. A benefit of this association that would be almost impossible to measure is the notion that *if others in the network can implement ePortfolios then so can I*, as well as the normalisation of the practice as an accepted part of teaching and learning.

5.5.9 Principle 9: Technology is used

Effective professional development uses technology to improve productivity and to facilitate communication. These characteristics mean there are two purposes for developing participants' skills in the use of tools. The first purpose is concerned with the use of tools in the classroom, including participants' capacity to demonstrate the tools to students and to support student use of the tools, and their understanding of the capabilities of the tools and hence the uses that might be made of the tools. The second purpose is concerned with the use of tools to support participant learning. For example, *The Learning Place* was an important tool used in the *ePortfolio Project* to support participant learning. The availability of a *Learning Place* mentor, who presented sessions at workshops and who could be accessed by teachers and schools, enhanced the use that was made of this tool.

5.5.10 Principle 10: Learning is Undertaken in a Supportive School Culture

The effectiveness of professional development is likely to be enhanced if it is undertaken in a supportive school culture. A supportive culture is one that recognises and rewards risk takers.

For example, the efforts of many teachers were rewarded through funding to release them from normal classroom duties to develop ePortfolio frameworks. Williams (2005) highlights the importance of the support of school and district administrators for professional development projects, and a list of her recommendations is provided in section 1.2.4. A supportive school environment also encourages participation in professional development projects. This characteristic of effective professional development varied considerably in the *ePortfolio Project*, and in the more positive cases school administrators purchased additional resources for teachers involved in the project, and stood with them during their case presentations. The presentations of cases encouraged participants to deprivatise their practice. Again, the issue of implementing ePortfolios was seen as a contributing factor because presenters were aware that what they were doing was innovative and that no-one could be expected to have all the answers. In effective professional development, participants contribute to the learning of their peers, e.g., in the *ePortfolio Project* participants facilitated sessions and supported their peers at the *ePortfolio Playground* workshops.

While a supportive school culture is seen to enhance the effectiveness of professional development, there may well be a case for effective professional development to enhance a school’s culture. Professional development in innovative practices has the potential to engage professionals in querying existing practices, arguing the merits of the new practices, and inquiring and investigating how new practices can be integrated into the everyday activity of a classroom and school. This is similar to the view taken by Cuttance and Stokes (2001a) about the relationship between innovation and a school’s culture. An informal measure of the effectiveness of professional development might therefore lie in the intellectual quality of professional discourse before and after the implementation of that professional development.

5.6 Features of the Research

This study highlights the potential effectiveness and efficiency of in-house professional development. Education authorities should recognize and value teachers and administrators who are self-motivated to initiate and support professional development projects within and outside their schools. While the implementation of ePortfolios was not a systemic imperative, the project nevertheless met numerous systemic goals such as the classroom integration of technology. These goals were achieved effectively because relevance was at a high level. That is, the needs of teachers were met and experienced practising teachers provided expertise. The goals were achieved efficiently, because although more than $A25 000 was received in grants over three years, the project would have been equally as successful with far less or no funding at all. The funding did allow selected teachers to be reassigned from their normal teaching duties at the beginning of the project to plan the implementation of ePortfolios in their classrooms. However, the keys to success were the commitment to sustained learning and the use of local experts, facilities, and resources in a systematic approach. The library of cases contributed to organizational memory, which other learners can access to solve issues. There is also a record for future professional development projects to improve what has been achieved, rather than beginning all over again.

5.6.1 The Researcher as Participant

This study was conducted by a serving principal who sought real world solutions to real world problems. Participants knew that data were being collected as the project developed, but the researcher was perceived as a professional educator working with and supporting other professional educators. The researcher could relate to the issues that were of real concern to teachers and school administrators because he was confronted with those issues in his everyday work. The researcher could structure activities within the projects to meet the real needs of participants within the constraints of a demanding context. The theory associated with this study is complex. One of the challenges of working in the real world was to present that theory in terms that would be meaningful to participants but honouring the concepts from which those terms were derived. This was important because metacognitive reflection and teaching teachers as we would have them teach were two key axioms in the projects.

5.6.2 Limitations of the Study

The sample for the study included teachers and school administrators employed by Education Queensland. The size of the sample restricts the generalisations able to be applied to the population. However, the focus of the study was on understanding each of the cases (Hammersley & Gomm, 2000). By undertaking a case study approach, a large amount of information was collected and analysed, contributing to practical understandings of meaning and actions (Miles & Huberman, 1994). The instruments included material from published studies so that questions in the interviews and written responses were not entirely derived from the researcher's experiences or notions about important issues. The instruments also included a variety of data sources so that information could be verified.

5.6.3 Significance of the Study

This study commenced shortly after a dissertation prepared by the researcher was examined and accepted for the award of Doctor of Education (Otto, 2003). While this second study builds on the previous research on principals' beliefs about teaching with ICTs, the two studies stand on their own as separate and complete pieces of work. However, a greater depth of analysis was achieved by continuing to conduct research in the same field. Furthermore, familiarity with the process of conducting research contributed to a focus on managing the projects, collecting and analysing data, and deriving conclusions. These areas are often not so well refined by "first time" researchers who are learning the content of their topic, research methods, and reporting in the dissertation genre. After serving 30 years as a principal, the researcher brought a wealth of practical experience to the study as well as knowledge of the associated theory and literature gained from tertiary study to Doctoral level. This combination of practice and theory has translated into an important research undertaking.

The study represents a unique adaptation and melding of Bain's (1999) four phases of a professional development project, Jonassen's (1999) principles for developing constructivist learning environments, Bandura's (1986) four sources of information to influence self-efficacy, the literature on case-based reasoning that belonged to another discipline, and concepts from the situative perspective such as cognitive flexibility, cognitive apprenticeship, and the experienced cognition framework. It is anticipated that the data obtained from the study will open up new lines of inquiry about best practices in professional development for technology integration, with implications for other areas of professional development in the field of education.

The study sought to utilize local resources, and in doing so explored partnerships with Education Queensland, the University of Southern Queensland, and the Australian Government. The study reflects the support that is available for professional development initiated by in-house leadership, and the outcomes that can be achieved.

5.6.4 Implications for Leadership

The Professional Development Framework could be adopted at the school, district, regional, and central levels as a systematic and integrated approach to professional development. The under utilization of expensive technology resources and the paucity of professional development programs should be of concern, and at the very least the leadership at these levels in the education organization should take note of the ten proposed principles of effective professional development. In particular, it should be recognised that professional development needs to be sustained, systematic, and reflect the needs of teachers and school administrators.

A theme of this study is the attention given to the consistent application of theory across all aspects of learning and practice, as reflected in the goal of teaching teachers as they should teach. Similarly, the style of leadership to support teachers in projects such as these should also be consistent with the situative perspective, as described by Walker and Lambert (1995):

> [Constructivist leading is] a reciprocal process among the adults in the school. Purposes and goals develop from among the participants, based upon values, beliefs, [and] individual and shared experiences. The school functions as a community that is self-motivating and that views the growth of its members as fundamental. There is an emphasis on language as a means for shaping the school culture, conveying

> commonality of experience, and articulating a joint vision. Shared inquiry is an important activity in problem identification and resolution; participants conduct action research and share findings as a way of improving practice. (p. 9)

This further enhances the value of the study in that those who practise this style of leadership will be seeking approaches to professional development that are compatible with their beliefs and understandings.

5.6.5 Further Studies

The value of the Professional Development Framework would be enhanced if it was applied and further refined in other projects. Other studies might consider replicating this study by applying the framework in its current format, or compare this study with other frameworks that support the design and development of a constructivist learning environment. While the framework is presented as a complete package, i.e., to develop an integrated system, other studies might focus on elements of the framework or the principles of effective professional development proposed in this chapter. For example, participants in all three projects in this study recognized the value of cases or exemplars. A further study could investigate the potential role of cases and case-based reasoning in professional development projects, along with the role of story as a tool, both in personal learning and in sharing learning with others. One of the principles proposed for effective professional development concerns the use of technology in supporting communication and collaboration. More could have been achieved in the *ePortfolio Project* in the use of technology in this way and the co-ordinator of the *ICTs in Mathematics* project reported teacher reluctance to contribute to online discussions. A further study could investigate the reason for this reluctance and propose new strategies.

While this study reported the responses of individuals, the focus was on general patterns of behaviour and understanding phenomena. In hindsight, it would have been possible to select a sample of participants in any or all of the three projects and gather additional information about their involvement and the subsequent effect on their practices. A further study could track individual participants in a professional development project using the Professional Development Framework or an instructional design based on a constructivist learning environment.

5.7 Final Thoughts: Views from the Researcher’s Chair

Prior to the commencement of this study I attended a district principals’ meeting convened to discuss how professional development was to be planned for the introduction of a new syllabus. The ideas that flowed from the meeting reflected the considerable experience of principals at the meeting and soon a number of workable strategies were proposed. What concerned me was that the strategies were piecemeal and not linked to a model of professional development with a consistent theoretical foundation. Instead, the strategies were based on intuition. I reflected that after 150 years of education in this state we were failing to build on the cumulative knowledge of a large organization to organise something as basic as the professional learning of our teachers. This suggested that knowledge was being viewed as an object that quickly became outdated and worthless, and that professional development successful a few years ago was no longer considered viable in the present context. It also suggested that after 150 years not one model of professional development had impressed anyone to the point that it should be established as a benchmark.

An investigation of the literature uncovered the logic and appeal of a constructivist learning environment (Jonassen, 1999), and a comment by my supervisor, Associate Professor Peter Albion about the potential of ePortfolios grew into a research project encompassing five years of study and field work. The most satisfying aspects of the study were the privilege of working with hundreds of dedicated teachers and school and district administrators, and being able to bring some meaning to their busy and complicated everyday practices. I am grateful for the enthusiastic support of participants, for the hard work of those who prepared and facilitated sessions, and for those in positions of authority who stood with me to support and promote the projects. Their only motivation and personal reward was to achieve the best outcomes for children.

References

Aamodt, A., & Plaza, E. (1994). Case-based reasoning: Foundational issues, methodological variations, and system approaches. *AI Communications, 7*(1), 39-59.

Abell, S.K., Bryan, L.A., & Anderson, M.A. (1998). Investigating preservice elementary science teacher reflective thinking using integrated media case-based instruction in elementary science teacher preparation. *Science Education, 82*(4), 491-510.

Aedo. I, Catenazzi, N., & Días, P. (1996). The evaluation of a hypermedia learning environment: The CESAR experience. *Journal of Educational Multimedia and Hypermedia, 5*(1), 49-72.

Ailwood, J., Chant, D., Gore, J., Hayes, D., Ladwig, J., Lingard, B., Luke, A., Mills, M., & Warry, M. (2001). Productive pedagogies: A multidimensional model of classroom practice. In Department of Education, *The Queensland School Reform Longitudinal Study: Supplementary Material* (pp. 96-115). Brisbane: The State of Queensland.

Ainley, J., Banks, D., & Fleming, M. (2002). The influence of IT: Perspectives from five Australian schools. *Journal of Computer Assisted Learning, 18*(4), 395-404.

Albion, P.R., & Ertmer, P.A. (2002). Beyond the foundations: The role of vision and belief in teachers' preparation for integration of technology. *Tech Trends, 46*(5), 34-38.

Alexander, S. (1999). An evaluation of innovative projects involving communication and information technology in higher education. *Higher Education Research & Development, 18*(2), 173-183.

Alexander, S., & McKenzie, J. (1998). *An evaluation of information technology projects for university learning.* Canberra: Australian Government Printing Service.

Alloway, N., Dalley-Trim, L., Gilbert, R., & Trist, S. (2006). *Success for Boys: Planning guide and core module.* Carlton South, Vic.: Curriculum Corporation.

Argyris, C., & Schön, D.A. (1974). *Theory in practice: Increasing professional effectiveness.* San Francisco: Jossey-Bass Publishers.

Argyris, C., & Schön, D.A. (1996). *Organisational learning II: Theory, method, and practice*. Reading, MA: Addison-Wesley.

Arredondo, D.E., & Rucinski, T.T. (1996). *Principals' epistemological beliefs and their support of integrated curriculum.* Paper presented at the Annual Meeting of Educational Administration (10th Louisville, KY, October 25-27).

Atkin, J. (1996). *From values and beliefs about learning to principles and practice*. Victoria: Incorporated Association of Registered Teachers of Victoria.

Atkinson, L.C. (2005). *Schools as learning organizations: Relationships between professional learning communities and technology-enriched learning environments*. (Doctoral dissertation, The University of Oklahoma, 2005). Dissertation Abstracts International, 66, 02A.

Atkinson, R. (2002). The life story interview. In J.F. Gubrium, & J.A. Holstein (Eds.), *Handbook of interview research: Context and method* (pp. 121-138). Thousand Oaks: Sage.

Australian Bureau of Statistics (2008). Retrieved July 12, 2008, from http://www.abs.gov.au/

Bain, J. D. (1999). Introduction to the special issue on evaluation of innovations. *Higher Education Research & Development, 18*(2), 165-172.

Baker, E. (2000). Integrating literacy and tool-based technologies: Examining the successes and challenges. In D.L. Johnson, C.D. Maddux, & L. Liu, *Integration of technology into the classroom: Case studies* (pp. 73-89). New York: The Haworth Press.

Ball, S. (1997). Unintended effects in educational research. In J.P. Keeves (Ed.), *Educational research, methodology, and measurement: An international handbook* (2nd ed., pp. 243-247). Oxford: Pergamon.

Bandura, A. (1986). *Social foundation of thought and action: A social cognitive theory.* Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: W.H. Freeman.

Barone, J.T., & Switzer, J.Y. (1995). *Interviewing art and skill.* Boston: Allyn and Bacon.

Barrett, H.C. (2000a). Create Your Own Electronic Portfolio: Using off-the-shelf software to showcase your own or student work. *Learning and Leading with Technology,* April.

Barrett, H.C. (2000b). *Electronic teaching portfolios: Multimedia skills + portfolio development = powerful professional development.* Association for the Advancement of Computing in Education (AACE).

Barrett, H.C. (2001). *Using Adobe Acrobat for Electronic Portfolio Development.* Paper presented at the Society for Information Technology in Education International Conference (12th, Orlando, FL, March 5-10).

Barrett, H.C. (2002). *Pedagogical Issues in Electronic Portfolio Implementation*. Retrieved October 1, 2004, from http://www.electronicportfolios.com/EPpedissues.pdf

Barrett, H.C. (2003). *The e-Portfolio: A revolutionary tool for education and training?* Paper presented at the International Conference on the e-Portfolio (1st, Poiters, France, October 9).

Barrett, H.C. (2004a). *Electronic portfolios as digital stories of deep learning.* (Work in Progress)

Barrett, H.C. (2004b). *Professional Development for Implementing Electronic Portfolios* (Work in progress). Retrieved October 1, 2004, from http://www.electronicportfolios.com/teachers/profdev.html

Barrett, H.C., & Wilkerson, J.W. (2004). *Conflicting paradigms in electronic portfolio approaches.* (Work in Progress)

Barton, J., & Collins, A. (1997). *Portfolio assessment: A handbook for educators.* New York: Dale Seymour Publications.

Baylor, A.L., & Ritchie, D. (2001). *Factors influencing technology integration: A quantitative nationwide study.* Paper presented at the Society for Information Technology in Education International Conference (12th, Orlando, FL, March 5-10).

Becker, H.J. (1998). Technology's role in constructivist reform. In H.B. Becker, M. Riel, Y. Wong, R. Anderson, S. Dexter, & A. Ronnkvist (Eds.), *The National survey of computer technology and instructional reform* (pp. 13-25). Irvine, CA: Center for Research on Information Technology and Organizations, University of California.

Becker, H.J., & Riel, M.M. (1999). *Teacher professionalism and the emergence of constructivist-compatible pedagogies.* Revised version of a paper presented at the Annual Meeting of the American Educational Research Association (Montreal, September).

Bednar, A.K., Cunningham, D., Duffy, T.M., & Perry, J.D. (1992). Theory into practice: How do we link? In T. Duffy, & D. Jonassen, D. (Eds.), *Constructivism and the technology of instruction: A conversation* (pp. 17-34). Hillsdale, NJ: Lawrence Erlbaum.

Bennett, C.K. (1996). Schools, technology, and educational leadership: A framework for change. *NASSP Bulletin, 80*(577), 57-65.

Bennett, S., Harper, B., & Hedberg, J. (2002). Designing real life cases to support authentic design activities. *Australian Journal of Educational Technology, 18*(1), 1-12.

Bereiter, C. (2002). *Education and mind in the knowledge age.* Mahwah, NJ: Lawrence Erlbaum.

Berlyne, D.E. (1965). Motivational problems raised by exploratory and epistemic behaviour. In S. Koch (Ed.), *Psychology: A study of science* (Vol. 5). New York: McGraw-Hill.

Bielenberg, D.R., & Carpenter-Smith, T. (1997). Efficacy of story in multimedia training. *Journal of Network and Computer Applications, 20*(2), 151-159.

Bisceglia, F.F. (1990). *The impact of computer familiarity and administrative style of leadership on computer implementation*. Dissertation Abstracts International, 52, 02A.

Blasi, L., Heinecke, W., Bartley, E., Blasi, L., Milman, N.B., & Dawson, K. (1999). *School technology implementation and results research project.* Paper presented at the Society for Information Technology and Teacher Education International Conference (10th, San Antonio, Texas, February 28-March 4).

Blumenfield, P.C., Soloway, E., Marx, R.W., Krajcik, J.S., Guzdial, M., & Palincsar, A. (1991). Motivating project-based learning: Sustaining the doing, supporting the learning. *Educational Psychologist, 26*(3/4), 369-398.

Bober, M.J. (2001). Technology integration: The difficulties inherent in measuring pedagogical change. *Tech Trends, 46*(1), 21-24.

Bogdan, R.C., & Biklen, S.K. (1992). *Qualitative research for education: An introduction to theory and methods*. Boston: Allyn and Bacon.

Borthwick, A., & Pierson, M. (2008). *Transforming classroom practice: Professional development strategies in educational technology*. Washington, DC: International Society for Technology in Education.

Boud, D., & Walker, D. (1993). Barriers to reflection on experience. In D. Boud, R. Cohen, & D. Walker (Eds.), *Using experience for learning* (pp. 73-86). London: The Society for Research into Higher Education.

Brew, A. (1993). Unlearning through experience. In D. Boud, R. Cohen, & D. Walker (Eds.), *Using experience for learning* (pp. 87-98). London: The Society for Research into Higher Education.

Brooks, J.G., & Brooks, M.G. (1999). The courage to be a constructivist. *Educational Leadership, 57*(3), 18-25.

Brown, A.L. (1992). Design experiments: Theoretical and methodological challenges in creating complex interventions in classrooms settings. *The Journal of Learning Sciences, 2*(2), 141-178.

Brown, J.S., Collins, A., & Duguid, P. (1989). *Situated cognition and the culture of learning. Educational Researcher, 18*(1), 32-42.

Bruffee, K.A. (1999). *Collaborative learning: Higher education, interdependence, and the authority of knowledge*. Baltimore: John Hopkins University Press.

Bruner, J. (1990). *Acts of meaning*. Cambridge, MA: Harvard University Press.

Bump, W. (2001). *Using a flexible format to create a constructivist learning environment in the educational computing course*. Paper presented at the Society for Information Technology in Education International Conference (12th, Orlando, FL, March 5-10).

Burgess, G. (2003). What makes a teacher; philosophy, learning style, or teaching style? *World Conference on Educational Multimedia, Hypermedia and Telecommunications, 1*, 2293-2295.

Burke, K. (1992). Introduction to Section 4. In K. Burke (Ed.), *Authentic assessment: A collection* (pp. 179-180). Palatine, Illinois: Skylight.

Burke, K., Fogarty, R., & Belgrad, S. (1996). *The mindful school: The portfolio connection.* Highett, Vic.: Hawker Brownlow.

Burke, K., Fogarty, R., & Belgrad, S. (2002). *The portfolio connection: Student work linked to standards.* Arlington Heights, IL: Skylight.

Calderhead, J., & Robson, M. (1991). Images of teaching: Student teachers' early conceptions of classroom practice. *Teaching and Teacher Education, 7*(1), 1-8.

Carlson, R.A. (1997). *Experienced cognition.* Mahwah, NJ: Lawrence Erlbaum Associates.

Carter, K. (1993). The place of story in research on teacher and teacher education. *Educational Researcher, 22*(1), 5-12.

Carter, K. (1999). What is a case? What is not a case? In M.A. Lundeberg, B.B. Levin, & H.L. Harrington (Eds.), *Who learns what from cases and how?: The research base for teaching and learning with cases* (pp. 165-175). Mahwah, NJ: Lawrence Erlbaum.

Chambers, D. (Ed.) (2000). *Click! (computer file): Computers and learning in classrooms K-6: A resource for teachers*. Melbourne: Melbourne University Press.

Choi, J.I., & Hannafin, M. (1995). Situated cognition and learning environments: Roles, structures, and implications for design. *Educational Technology Research & Development, 43*(2), 53-69.

Choi, J.I., & Hannafin, M. (2003). *Situated cognition and learning environments: Roles, structures, and implications for design*. Retrieved August 20, 2003, from http://tecfa.unige.ch/staf/staf-e/pellerin/staf15/situacogn.htm

Choi, I., & Jonassen, D.H. (2000). Learning objectives from the perspective of the experienced cognition framework. *Educational Technology, 11/12*, 36-40.

Clancey, W.J. (1995). Practice cannot be reduced to theory: Knowledge, representations, and change in the workplace. In S. Bagnara, C. Zuccermaglio, & S. Stuckey (Eds.), *Organizational learning and technological change* (pp. 16-46). New York: Springer-Verlag.

Colaric, S.M., Turgeon, A.J., & Jonassen, D.H. (2002). Development of a web-based case library. *Journal of Educational Technology Systems, 31*(1), 63-70.

Collins, A. (1996). Design issues for learning environments. In S. Vosniadou, E. de Corte, R. Glasser, & H. Mandl (Eds.), *International perspectives on the design of technology-supported learning environments* (pp. 347-361). Mahwah, NJ: Lawrence Erlbaum.

Collins, A., Joseph, D., & Bielaczyc, K. (2004). Design research: Theoretical and methodological issues. *The Journal of Learning Sciences*, *13*(1), 15-42.

Compeau, D.R., & Higgins, C.A. (1995). Computer self-efficacy: Development of a measure and initial test. *MIS Quarterly, 19*(2), 189-212.

Compeau, D.R., Higgins, C.A., & Huff, S. (1999). Social cognitive theory and individual reactions to computing technology: A longitudinal study. *MIS Quarterly, 23*(2), 145-158.

Conlon, T. (2000). Visions of change: Information technology, education and postmodernism. *British Journal of Educational Technology, 31*(2), 109-116.

Cook, J. (1982). Negotiating the curriculum: Programming for learning. In G. Boomer (Ed.), *Negotiating the curriculum: A teacher-student partnership* (pp. 133-149). Sydney: Ashton Scholastic.

Costanzo, W. (1994). Reading, writing, and thinking in an age of electronic literacy. In C.L. Selfe, & S. Hilligoss (Eds.), *Literacy and computers: The complications of teaching and learning with technology* (pp. 11-21). New York: The Modern Language Association of America.

Crane B.E. (2000). *Teaching with the Internet: Strategies and models for K-12 curricula*. New York: Neal-Schuman Publishers.

Crompton, P. (1996). Evaluation: A practical guide to methods. In G. Stoner (Ed.), *Implementing Learning Technology* (pp. 66-73). Edinburgh, Scotland: Learning Technology Dissemination Initiative.

Crowther, F. (1999). *The IDEAS project: Guidelines for exploration and trial in Queensland State Schools.* Brisbane: Education Queensland.

Cuban, L. (1993). *How teachers taught: Constancy and change in American classrooms 1890-1990* (2nd ed.). New York: Teachers College, Columbia University.

Cunningham, D.J. (1992). Assessing constructions and constructing assessments: A dialogue. In T. Duffy, & D. Jonassen, D. (Eds.), *Constructivism and the technology of instruction: A conversation* (pp. 17-34). Hillsdale, NJ: Lawrence Erlbaum.

Cuttance, P. (2001a). Executive summary. In P. Cuttance (Ed.), *School innovation: Pathway to the knowledge society* (pp. xiii-xxix). Canberra: DETYA.

Cuttance, P. (2001b). Information and communication technologies. In P. Cuttance (Ed.), *School innovation: Pathway to the knowledge society* (pp. 73-100). Canberra: DETYA.

Cuttance, P. and Stokes, S.A. (2001a). Innovation and best practice. In P. Cuttance (Ed.), *School innovation: Pathway to the knowledge society* (pp. 1-30). Canberra: DETYA.

Cuttance, P. and Stokes, S.A. (2001b). Lessons for practice. In P. Cuttance (Ed.), *School innovation: Pathway to the knowledge society* (pp. 185-205). Canberra: DETYA.

Danzig, A.B. (1997). *Building expertise in educational leadership by writing and reflecting on stories of practice.* Paper presented at the Annual Meeting of the American Educational Research Association (Chicago, IL, March 24-28).

Davis, N. (2001). The virtual community of teachers: 'Power stations' for learners nationwide? In M. Leask (Ed.), *Issues in Teaching using ICT* (pp. 31-48). London: Routledge Falmer.

Department of Education, Science and Training (DEST) (2001). *Making better connections.* Canberra: Commonwealth of Australia.

Department of Education, Training and the Arts (2008). Retrieved August 15, 2008, from http://education.qld.gov.au/qcar/

DiMauro, V., & Jacobs, G. (1995). Collaborative Electronic Network Building Collaborative Electronic Network Building. *Journal of Computers in Mathematics and Science Teaching*, *14*(1-2), 119-131.

Dimmock, C., & Hattie, J. (1996). School principals' self-efficacy and its measurement in a context of restructuring. *School effectiveness and School Improvement, 7*(1), 62-75.

Doyle, C.S. (1992). *Outcome measures for information literacy within the national educational goals of 1990: Final report to the national forum on information literacy*. Syracuse, NY: ERIC Clearinghouse on Information Resources.

Drake, C., Spillane, J.P., & Hufferd-Ackles, K. (2001). Storied identities: Teacher learning and subject-matter context. *Journal of Curriculum Studies*, *33*(1), 1-23.

Duffy, T., & Bednar, A.K. (1992). Attempting to come to grips with alternative perspectives. In T. Duffy, & D. Jonassen (Eds.), *Constructivism and the technology of instruction: A conversation* (pp. 128-135). Hillsdale, NJ: Lawrence Erlbaum.

Duffy, T., & Jonassen, D. (1992). Constructivism: New implications for instructional technology. In T. Duffy, & D. Jonassen, D. (Eds.), *Constructivism and the technology of instruction: A conversation* (pp. 1-16). Hillsdale, NJ: Lawrence Erlbaum.

Education Queensland (1999). *Minimum standards for teachers: Learning technology*. Brisbane: The State of Queensland.

Education Queensland (2000). *Literate Futures: Report of the literacy review for Queensland State Schools (Teacher summary version)*. Brisbane: The State of Queensland (Department of Education).

Education Queensland (2001a). *Years 1-10 curriculum framework for Education Queensland schools: Policy and guidelines*. Brisbane: The State of Queensland, Department of Education.

Education Queensland (2001b). *Annual statement of expectations for schools 2002*. Brisbane: The State of Queensland.

Education Queensland (2002). Why QSCC syllabuses are outcome based. Brisbane: The State of Queensland.

Education Queensland (2005). *Professional standards for teachers: Guidelines for professional practice.* Brisbane: Queensland Government.

Education Queensland (2006). *Smart classrooms professional development framework*. Retrieved November 16, 2006, from http://education.qld.gov.au/smartclassrooms/strategy/tsdev_pd.html

Engel, B.S. (1996). Portfolio assessment and the new paradigm: New instruments and new places. In R. Fogarty (Ed.), *Student Portfolios: A collection of articles* (pp. 3-12). Highett, Vic.: Hawker Brownlow.

Eraut, M. (1994). *Developing professional knowledge and competence.* London: The Falmer Press.

Ertmer, P.A. (1999). Addressing first- and second-order barriers to change: Strategies for technology integration. *Educational Technology Research and Development*, *47*(4), 47-61.

Ertmer, P.A., Gopalakrishnan, S., & Ross, E. (2000). *Technology-using teachers: Comparing perceptions of exemplary technology use to best practice.* Paper presented at the Annual Meeting of the American Educational Research Association (New Orleans, April).

Ertmer, P.A., Newby, T.J., & MacDougall, M. (1996). Student's responses and approaches to case-based instruction: The role of reflective self-regulation. *American Educational Research Journal*, *33*(3), 719-752.

Esson, K., Johnson, K., & Vinson, T. (2002). *Inquiry into the provision of Public Education in NSW*. Sydney: NSW Teachers Federation and Federation of P&C Associations of NSW.

Feltovich, P.J., Spiro, R.J., Coulson, R.L., & Feltovich, J. (1996). Collaboration within and among minds: Mastering complexity, individually and in groups. In T. Koschmann (Ed.), *CSCL: Theory and practice of an emerging paradigm* (pp. 25-43). Mahwah, NJ: Lawrence Erlbaum.

Fokias, F. (1999). Achieving clarity: Principle to practice. The difference reflection makes in implementing a policy for information technology in a primary school. *Journal of Information Technology for Teacher Education*, *8*(1), 13-24.

Fowler, F.J. (1988). *Survey research methods*. Newbury Park, CA: Sage.

Gage, N. (1985). *Hard gains in the soft sciences: The case for pedagogy.* Bloomington, IN: Phi Delta Kappa.

Gage, N.L. (1978). *The scientific basis of the art of teaching.* New York: Teachers College Press.

Ge, X., & Land, S.M. (2003). Scaffolding student's problem-solving processes in an ill-structured task using question prompts and peer interactions. *Educational Technology Research & Development*, *51*(1), 21-38.

Ghaith, G., & Shaaban, K. (1999). The relationship between perceptions of teaching concerns, teacher efficacy, and selected teacher characteristics. *Teaching and Teacher Education, 15*(5), 487-496.

Gibson, D., & Barrett, H. (2002). Directions in electronic portfolio development. *Contemporary Issues in Technology and Teacher Education, 2*(4), 556-573.

Gibson, I.W. (2001). *The role of school administrators in the process of effectively integrating educational technology into school learning environments: New research from the mid-west.* Paper presented at the Society for Information Technology in Education International Conference (12th, Orlando, FL, March 5-10).

Glaser, R., & Chi, M.T.H. (1988). Overview. In M.T.H. Chi, R. Glaser, & M.J. Farr (Eds.), *The nature of expertise* (pp. xv-xxviii). Hillsdale, NJ: Lawrence Erlbaum.

Goodson, I.F., & Mangan, J.M. (1996). Computer literacy as ideology. *British Journal of Sociology of Education, 17*(1), 65-80.

Grabe, M., & Grabe, C. (1996). *Integrating Technology for Meaningful Learning.* Boston: Houghton Mifflin.

Grassian, E. (2003). *Criteria for evaluating web folios*. Retrieved October 1, 2004, from http://www.tncc.vccs.edu/faculty/dollieslager/evalfolios.html

Greeno, J.G. (1997). On claims that answer the wrong questions. *Educational Researcher, 26*(1), 5-17.

Greeno, J.G., & the Middle School Mathematics Through Applications Projects Group (1998). The situativity of knowing, learning, and research. *American Psychologist 53*(1), 5-26.

Griffin, P. (1997). OBE: Challenges and opportunities. In P. Griffin, & P. Smith (Eds.), *Outcome-based education: Issues and strategies for schools* (pp. 6-9). Canberra, ACT: Australian Curriculum Studies Association.

Guba, E.G., & Lincoln, Y.S. (1989). *Fourth generation evaluation.* Newbury Park, CA: Sage Publications.

Gunn, C. (1999). They love it, but do they learn from it? Evaluating the educational impact of innovations. *Higher Education Research & Development, 18*(2), 185-199.

Guskey, T.R. (2000). *Evaluating professional development*. California: Thousand Oaks

Guskey, TR, & Sparks, D. (1991). What to consider when evaluating staff development. *Educational Leadership, 49*(3). 73-76

Guzdial, M., Kolodner, J., Hmelo, C., Narayanan, H., Carlson, D., Rappin, N., Hübscher, R., Turns, J., & Newstetter, W. (1996). Computer support for learning through complex problem solving. *Communications of the ACM, 29*(4), 43-45.

Guzdial, M., & Turns, J. (2000). Effective discussion through a computer-mediated anchored forum. *Journal of the Learning Sciences, 9*(4), 437-470.

Hadley, M., & Sheingold, K. (1993). Commonalities and distinctive patterns in teachers' integration of computers. *American Journal of Education, 101*(3), 261-315.

Hammersley, M., & Gomm, R. (2000). Introduction. In R. Gomm, M. Hammersley, & P. Foster (Eds.), *Case study method: Key issues, key texts* (pp. 1-16). London: Sage.

Hannafin, M.J., & Land, S.M. (1997). The foundations and assumptions of technology enhanced student-centered learning environments. *Instructional Science, 25*(3), 167-202.

Hartnell-Young, E. (2004). *Digital Portfolios: Their use on education.* Retrieved, October, 2004, Http://www.icponline.org/feature_articles/f2_00.htm

Hartnell-Young, E., & Morriss, M. (1999). *Digital professional portfolios for change.* Australia: Hawker Brownlow.

Heath, M., & Ravitz, J. (2001). *Teaching, learning and computing: What teachers say*. Paper presented at the World Conference on Educational Multimedia, Hypermedia & Telecommunications (13th, Tampere, Finland, June 25-30).

Heath, M.J. (2000). *Active Learning Environments Prepare Teachers for Technology*. Paper presented at the Society for Information Technology in Education International Conference (11th, San Diego, CA, February 8-12).

Hebert, E.A. (1992) Portfolios invite reflection from students and staff. *Educational Leadership, 49*(8), 58-61.

Hernandez-Serrano, J., & Jonassen, D.H. (2003). The effects of case libraries on problem solving. *Journal of Computer Assisted Learning, 19*, 103-114.

Herrington, J., & Oliver, R. (1999). Using situated learning and multimedia to investigate higher order thinking. *Journal of Interactive Learning Research, 10*(1), 3-24.

Hill, P.W., & Crévola, C.A. (1997). Key features to a whole-school, design approach to literacy teaching in schools. Retrieved November 12, 2002, from http://www.sofweb.vic.edu.au/eys/pdf/hillcrev.pdf

Honebein, P.C. (1995). Seven goals for the design of constructivist learning environments. In B.G. Wilson (Ed.), *Constructivist learning environments: Case studies in instructional design* (pp. 11-24). Englewood Cliffs, NJ: Educational Technology Publications.

Hope, W.C., Kelley, B., & Guyden, J.A. (2000). *Technology standards for school administrators: Implications for administrator preparation programs*. Paper presented at the Society for Information Technology in Education International Conference (11th, San Diego, CA, February 8-12).

Hughes, J.E., & Holmes, A. (2005). Introduction to the issue. *Journal of Educational Computing Research, 32*(4) 309-313.

Hunter, L. (2000-2001). The Queensland 'New Basics': An interview with Alan Luke. *English in Australia, 129-130*, 132-140.

Jonassen, D.H. (1991). Objectivism versus constructivism: Do we need a new philosophical paradigm? *Educational Technology Research & Development, 39*(3), 5-14.

Jonassen, D.H. (1992). Evaluating constructivist learning. In T. Duffy, & D.H. Jonassen (Eds.), *Constructivism and the technology of instruction: A conversation* (pp. 137-148). Hillsdale, NJ: Lawrence Erlbaum.

Jonassen, D.H. (1993a). Thinking technology: The trouble with learning environments. *Educational Technology, 1*, 35-37.

Jonassen, D.H. (1994). Thinking technology: Toward a constructivist design model. *Educational Technology, 4*, 34-37.

Jonassen, D.H. (1996). Scaffolding diagnostic reasoning in case-based-learning environments. *Journal of Computing in Higher Education, 8*(1), 48-68.

Jonassen, D.H. (1997). Instructional design models for well-structured and ill-structured problem solving learning outcomes. *Educational Technology Research & Development, 45*(1), 65-90.

Jonassen, D.H. (1999). Designing constructivist learning environments. In C.M. Reigeluth (Ed.), *Instructional-design theories and models: A new paradigm of instructional theory* (vol. 2, pp. 215-239). Mahwah, NJ: Lawrence Erlbaum.

Jonassen, D.H. (2000). Toward a design theory of problem solving. *Educational Technology Research and Development, 48*(4), 63-85.

Jonassen, D.H. (2003). *Design of constructivist learning environments.* Retrieved December 4, 2003, from http://tiger.coe.missouri.edu/~jonassen/courses/CLE/

Jonassen, D.H., Beisner, K., & Yacci, M. (1993). *Structural Knowledge: Techniques for representing, conveying, and acquiring structural knowledge*. Hillsdale, NJ: Lawrence Erlbaum.

Jonassen, D.H., Carr, C., & Yueh, H.P. (1998) Computers as Mindtools for Engaging Learners in Critical Thinking. *Tech Trends, 43*(2), 24-32.

Jonassen, D.H., Davidson, M., Collins, M., Campbell, J., Haag, B.B. (1995). Constructivism and computer-mediated communication in distance education. *The American Journal of Distance Education, 9*(2), 7-26.

Jonassen, D.H., & Hernandez-Serrano, J. (2002). Case-based reasoning and instructional design: Using stories to support problem solving. *Educational Technology Research and Development, 50*(2), 65-77.

Jonassen, D.H., & Land, S.M. (2000). Preface. In D.H. Jonassen, & S.M. Land (Eds.), *Theoretical foundations of learning environments* (pp iii-ix). Mahwah, NJ: Lawrence Erlbaum.

Jonassen, D.H., & Rohrer-Murphy, L. (1999). Activity theory as a framework for designing constructivist learning environments. *Educational Technology Research and Development, 47*(1), 61-79.

Jonassen, D.H., Mayes, T., & McAleese, R. (1991). A manifesto for a constructivist approach to uses of technology in higher education. In T.M. Duffy, J. Lowyck, & D.H. Jonassen

(Eds.), *Designing environments for constructive learning* (pp. 231-247). Berlin: Springer-Verlag.

Jonassen, D.H., Tessmer, M., & Hannum, W.H. (1999). *Task analysis methods for instructional design.* Mahwah, NJ: Lawrence Erlbaum.

Jonassen, D.H., Wilson, B.G., Wang, S., & Grabinger, R.S. (1993). Constructivist uses of expert systems to support learning. *Journal of Computer-Based Instruction, 20*(3), 86-94.

Karni, R., & Kaner, M. (2002). *CBR-based knowledge-focusing for training in decision making within project management processes*. Workshop on Case-Based Reasoning for Education and Training (Aberdeen, Scotland, September 4).

Keller, J.M. (1983). Motivational design of instruction. In C.M. Reigeluth (Ed.), *Instructional - design theories and models: An overview of their current status* (pp. 383-434). Hillsdale, NJ: Lawrence Erlbaum.

Keller, J.M., & Kopp, T.W. (1987). An application of the ARCS model of motivational design. In C.M. Reigeluth (Ed.), *Instructional theories in action: Lessons illustrating selected theories and models* (pp. 289-320). Hillsdale, NJ: Lawrence Erlbaum.

Kerr, S.T. (1999). Visions of sugarplums: The future of technology, education, and the schools. In M.J. Early, & K.J. Rehage (Eds.), *Issues in curriculum: A selection of chapters from past NSSE yearbooks* (pp. 171-195). Chicago: University of Chicago Press.

King, M.B., & Newmann, F.M. (2001). Building school capacity through professional development: Conceptual and empirical considerations. *The International Journal of Educational Management, 15*(2), 86-93.

Kline, M.C. (2007). *Developing conceptions of teaching and learning within communities of practice.* (Doctoral dissertation, University of Pennsylvania, 2007). Dissertation Abstracts International, 68, 03A.

Kolodner, J. (1993). *Case-based reasoning.* New York: Morgan Kaufman.

Kolodner, J.L. (1996). Making the implicit explicit: Clarifying the principles of case-based reasoning. In D.B. Leake (Ed.), *Case-based reasoning: Experiences, lessons, and future directions (pp. 349-370).* Menlo Park, California: AAAI Press.

Kolodner, J.L. (1997). Educational implications of analogy: A view from case-based reasoning. *The American Psychologist, 52*(1), 57-66.

Kolodner, J.L., & Leake, D.B. (1996). A tutorial introduction to case-based reasoning indexing evaluations of buildings to aid conceptual design. In D.B. Leake (Ed.), *Case-based reasoning: Experiences, lessons, and future directions* (pp. 31-66). Menlo Park, CA: AAAI Press.

Koschman, T., Kelson, A.C., Feltovich, P.J., & Barrows, H.S. (1996). Computer-supported problem-based learning: A principled approach to the use of computers in collaborative learning. In T. Koschmann (Ed.), *CSCL: Theory and practice of an emerging paradigm* (pp. 83-124). Mahwah, NJ: Lawrence Erlbaum Associates.

Kuutti (1991). Activity theory as a potential framework for human-computer interaction research. In B.A. Nardi (Ed.), *Context and consciousness: Activity theory and human-computer interaction*. Cambridge, MA: MIT Press.

Lankshear, C., Snyder, I., & Green, B. (2000). *Teachers and techno-literacy: Managing literacy, technology and learning in schools.* St Leonards, NSW: Allen and Unwin.

Lawless, K.A., & Pellegrino, J.W. (2007). Professional development in integrating technology into teaching and learning: Knowns, unknowns, and ways to pursue better questions and answers. *Review of Educational Research, 77*(4), 575-614.

Leake, D.B. (1996). CBR in context: The present and the future. In D.B. Leake (Ed.), *Case-based reasoning: Experiences, lessons, and future directions* (pp. 3-30). Menlo Park, CA: AAAI Press.

Levin, B.B. (1995). Using the case method in teacher education: The role of discussion and experience in teachers' thinking about cases. *Teaching and Teacher Education, 11*(1), 63-79.

Lin, X. (2001). Designing metacognitive activities. *Educational Technology Research and Development, 49*(2), 23-40.

Loveless, A. (1995). *The role of IT: Practical issues for primary teachers.* London: Cassell.

Loveless, A., DeVoogd, G.L., & Bohlin, R.M. (2001). Something old, something new: Is pedagogy affected by ICT? In A. Loveless, & V. Ellis (Eds.), *ICT, pedagogy and the curriculum* (pp. 63-83). London: Routledge Falmer.

Mack, R.L., & Nielsen, J. (1994). Executive summary. In J. Nielsen, & R.L. Mack (Eds.), *Usability inspection methods* (pp. 1-23). New York: John Wiley & Sons.

Marcinkiewicz, H.R. (1993-94). Computers and teachers: Factors influencing computer use in the classroom. *Journal on Research on Computing in Education, 26*(2), 220-236.

Markuson, C. (1986). Making it happen, taking charge of the information curriculum. *School Library Media Quarterly, 15*(1), 37-40.

Mattingly, C. (1991). Narrative reflections on practical actions: Two learning experiments in reflective storytelling. In D.A. Schön (Ed.), *The reflective turn: Case studies in and on educational practice* (pp. 235-257). New York: Teachers College, Columbia University.

Maw, W.H., & Maw, E.H. (1968). Self appraisal of curiosity. *Journal of Educational Research, 61*, 462-466.

Mayer, R.E. (1999). Designing instruction for constructivist learning. In C.M. Reigeluth (Ed.), *Instructional-design theories and models: A new paradigm of instructional theory* (vol. 2, pp. 141-159). Mahwah, NJ: Lawrence Erlbaum.

McLellan, H. (1996). Situated learning: Multiple perspectives. In H. McLellan (Ed.), *Situated learning perspectives* (pp. 5-17). Englewood Cliffs, NJ: Educational Technology Publications.

McLoughlin, C.M., & Luca, J. (2000). Learning through self-direction: The influence of task design on team-based professional knowledge building in an online environment. In R. Sims, M. O'Reilly, & S. Sawkins (Eds.), *Learning to choose: Choosing to learn* (pp. 327-338). Proceedings of the Annual Conference of the Australasian Society for Computers in Learning in Tertiary Education (17th, Lismore, NSW).

McNabb, M., Hawkes, M., & Rouk, Ü. (1999). *Critical issues in evaluating the effectiveness of technology.* The Secretary's Conference on Educational Technology: Evaluating the Effectiveness of Technology (Washington, DC, July 12-13).

Means, B., & Olson, K. (1994). The link between technology and authentic learning. *Educational Leadership, 51*(7), 15-19.

Means, B., & Olson, K. (1995). *Technology and education reform*. Washington, DC: U.S. Dept. of Education, Office of Educational Research and Improvement, Office of Reform Assistance and Dissemination.

Mellar, H., & Howell-Richardson, C. (1999). Techniques for analysing online interaction. In M. Selinger & J. Pearson (Eds.), *Telematics in education: Trends and issues* (pp. 88-104). Oxford: Pergamon.

Meltzer, J., & Sherman, T.M. (1997). Ten commandments for successful technology implementation and staff development. *NASSP Bulletin, 81*(585), 23-32.

Mercer, N., Littleton, K., & Wegerif, R. (2004). Methods for studying the processes of interaction and collaborative activity in computer-based educational activities. *Technology, Pedagogy and Education, 13*(2), 195-212.

Meredyth, D., Russell, N. Blackwood, L., Thomas, J., & Wise, P. (1999). *Real time: Computers, change and schooling.* Brisbane: Department of Education, Training and Youth Affairs.

Middleton, M., & Hill, J. (1996). *Changing schools: Challenging assumptions and exploring possibilities.* Highett, Vic.: Hawker Brownlow Education.

Miles, M.B., & Huberman, A.M. (1994). *Qualitative data analysis* (2nd ed.). Thousand Oaks: Sage.

Minichiello, V., Aroni, R., Timewell, E., & Alexander, L. (1995). *In-depth interviewing: Principles, techniques, analysis* (2nd ed.). Sydney: Longman.

Mize, C.D., & Gibbons, A. (2000). *More than inventory: Effective integration of instructional technology to support student learning in K-12 schools*. Paper presented at the Society for Information Technology in Education International Conference (11th, San Diego, CA, February 8-12).

Moersch, C. (1995). Levels of technology implementation (LoTi): A framework for measuring classroom technology use. *Learning and Leading with Technology, 23*(5), 40-42.

Moersch, C. (1996-97). Computer efficiency: Measuring the instructional use of technology. *Learning and Leading with Technology, 24*(4), 52-56.

Morris, B. (1995). Case-based reasoning. *AI/ES Update, 5*(1).

Morrison, G.R., Lowther, D.L., & DeMeulle, L. (1999). *Integrating computer technology into the classroom.* Upper Saddle River, NJ: Merrill/Prentice Hall.

Negroponte, N. (1995). *Being digital.* New York: Knopf.

Nespor, J. (1987). The role of beliefs in the practice of teaching. *Journal of Curriculum Studies, 19*(4), 317-328.

Newhouse, P. (1999). *Teachers use computers in the 21st century: A guide for teachers*. Willetton, W.A.: Specialist Educational Services for the Newhouse Family Trust.

Nielsen, J. (1994). Heuristic evaluation. In J. Nielsen, & R.L. Mack (Eds.), *Usability inspection methods* (pp. 25-61). New York: John Wiley & Sons.

Niguidula, D. (1997). Picturing performance with digital portfolios. *Educational Leadership*, November, 26-29.

Nisbett, R., & Ross, L. (1980). *Human inference: Strategies and shortcomings of social judgment.* Englewood Cliffs, NJ: Prentice-Hall.

O'Rouke, M. (2001). Engaging students through ICT: A multiliteracies approach. *Teacher Learning and Network Journal: Change, Growth and Innovation, 8*(3), 12-13.

Orr, J.E. (1996). *Talking about machines: An ethnography of a modern job.* Ithaca, NY: Cornell University Press.

Otto, T.L. (2003). *Principals' beliefs about teaching with information and communication technologies.* An unpublished dissertation. Toowoomba: University of Southern Queensland.

Otto, T.L. (2008). Designing and sustaining Constructivist learning environments. In A. Borthwick, & M. Pierson (Eds.), *Transforming classroom practice: Professional development strategies in educational technology* (pp. 51-68). Washington, DC: International Society for Technology in Education.

Pajares, M.F. (1992). Teacher's beliefs and educational research: Cleaning up a messy construct. *Review of Educational Research, 62*(3), 307-332.

Paulson, F.L., & Paulson, P.R. (1991). *Portfolios: Stories of knowing.* Paper presented at the Annual Meeting of the Claremont Reading Conference (54th, March).

Paulson, F.L., & Paulson, P.R. (1996a). Assessing Portfolios Using the Constructivist Paradigm. In R. Fogarty (Ed.), *Student portfolios: A collection of articles* (pp. 13-32). Highett, Vic.: Hawker Brownlow.

Paulson, F.L., & Paulson, P.R. (1996b). Student-led portfolio conferences. In R. Fogarty (Ed.), *Student portfolios: A collection of articles* (pp. 165-182). Highett, Vic.: Hawker Brownlow.

Paulson, F.L., Paulson, P.R., & Meyer, C.A. (1996). What makes a portfolio a portfolio? In R. Fogarty (Ed.), *Student portfolios: A collection of articles* (pp. 69-74). Highett, Vic.: Hawker Brownlow.

Penn State (2003). *General e-Portfolio Evaluation Criteria*. Retrieved October 1, 2004, from http://eportfolio.psu.edu/select/criteria.shtml

Perkins, D.N. (1992). What constructivism demands of the learner. In T. Duffy, & D. Jonassen (Eds.), *Constructivism and the technology of instruction: A conversation* (pp. 161-165). Hillsdale, NJ: Lawrence Erlbaum.

Phelps, R., Graham, A., & Kerr, B. (2004). Teachers and ICT: Exploring a metacognitive approach to professional development. *Australian Journal of Educational Technology, 20*(1), 49-68.

Pfennig, D.W. (1994). *A study of the relationship between administrative computing and instructional leadership (computers)*. Dissertation Abstracts International, 55, 05A.

Phillips, R. (1997). Educational considerations. In R. Phillips (Ed.), *The developers' handbook to interactive multimedia: A practical guide for educational applications* (pp. 18-35). London: Kogan Page.

Phillips, R. (2001). *Learning-centred evaluation of computer-facilitated learning projects in higher education.* Perth, W.A.: Committee for University Teaching and Staff Development.

Pierson, M.E. (2001). Technology integration practice as a function of pedagogical expertise. *Journal of Research on Computing in Education. 33*(4), 413-430.

Polkinghorne, D. (1988). *Narrative knowing and the human sciences*. Albany, NY: State University of New York Press.
Putnam, R. T., & Borko, H. (2000). What do new views of knowledge and thinking have to say about research on teacher learning? *Educational Researcher, 29*(1), 4-15.
Queensland Consortium for Professional Development (2004). *A way forward: The future for teacher professional associations and networks.* Brisbane: Queensland Board of Teacher Registration.
Queensland Government (2002). *Queensland the smart state: Education and training reforms for the future*. Brisbane: The State of Queensland, Department of the Premier and Cabinet.
Queensland School Curriculum Council (2002a). *Technology: Years 1 to 10 syllabus.* Brisbane: The State of Queensland, Office of Queensland School Curriculum Council.
Queensland School Curriculum Council (2002b). *Information and communication technology education subject area: Syllabus and guidelines (Second Consultative Draft).* Brisbane: The State of Queensland, Office of Queensland School Curriculum Council.
Queensland University of Technology (2005a). Project information. Retrieved November 25, 2005, from http://www.studentportfolio.qut.edu.au/projectinfo/
Queensland University of Technology (2005b). ePortfolio gives savvy students the jump on jobs. Retrieved April 10, 2005, from http://www.news.qut.edu.au/cgi-bin/WebObjects/News.woa/wa/
Ravitz, J.L., Becker, H.J., & Wong, Y.T. (2000). *Constructivist-compatible beliefs and practices among U.S. teachers.* Irvine, CA: Center for Research on Information Technology and Organizations, University of California.
Reeves, T.C. (1992). Evaluating interactive multimedia. *Educational Technology, 31*(5), 47-52.
Reigeluth, C.M. (1999). What is instructional-design theory and how is it changing? In C.M. Reigeluth (Ed.), *Instructional-design theories and models: A new paradigm of instructional theory* (Vol. 2, pp. 5-29). Mahwah, NJ: Lawrence Erlbaum.
Riesbeck, C.K., & Schank, R.S. (1989). *Inside case-based reasoning*. Hillsdale, NJ: Lawrence Erlbaum.
Riessman, C.K. (2002). Analysis of personal narratives. In J.F. Gubrium, & J.A. Holstein (Eds.), *Handbook of interview research: Context and method* (pp. 695-707). Thousand Oaks: Sage.
Robinson, V.M.J. (2001). Descriptive and normative research on organizational learning: Locating the contribution of Argyris and Schön. *The International Journal of Educational Management, 15*(2), 58-67.
Roblyer, M.D. (1993). Why use technology in teaching? Making a case beyond research results. *Florida Technology in Education Quarterly, 5*(4), 7-13.
Rogers, B.A. (2000). *The correlation between teachers' perceptions of principals' technology leadership and the integration of educational technology*. Dissertation Abstracts International, 61, 10A.
Romberg, T.A., & Price, G.G. (1999). Curriculum implementation and self development as cultural change. In M.J. Early, & K.J. Rehage (Eds.), *Issues in Curriculum: A selection of chapters from past NSSE yearbooks* (pp. 201-230). Chicago: University of Chicago press.
Ropp, M.M. (1998). *A new approach to supporting reflective, self-regulated computer learning*. Paper presented at the Society for Information Technology and Teacher Education International Conference (9th, Washington, DC, March 10-14).
Ross, J.A., Hogaboam-Gray, A., & Hannay, L. (2001). Effects of teacher efficacy on computer skills and computer cognitions of Canadian students in grades K-3. *The Elementary School Journal, 102*(2), 141-156.
Ross, T.W., & Bailey, G.D. (1997). *Technology-based learning: A handbook for teachers and technology leaders.* Cheltenham, Vic.: Hawker Brownlow Education.
Salomon, G. (1996). Studying novel learning environments as patterns of change. In S. Vosniadou, E de Corte, R. Glasser, & H. Mandl (Eds.), *International perspectives on the design of technology-supported learning environments* (pp. 363-377). Mahwah, NJ: Lawrence Erlbaum.

Sandholtz, J.H., & Ringstaff, C. (1996). Teacher change in technology rich classrooms. In C. Fisher, D.C. Dwyer, & K. Yocam (Eds.), *Education and technology: Reflections on computing in classrooms* (pp. 281-300). San Francisco: Jossey-Bass.

Sandholtz, J.H., Ringstaff, C., & Dwyer, D.C. (1996). *Teaching with technology: Creating student-centered classrooms.* New York: Teachers College Press.

Savery, J.R., & Duffy, T.M. (1995). Problem based learning: An instructional model and its constructivist framework. *Educational Technology, 35*(5), 31-38.

Schank, R.C. (1988). *Reminding and memory*. Proceedings of the DARPA Case-Based Reasoning Workshop.

Scheerens, J., & Bosker, R.J. (1997). *The foundations of educational effectiveness*. New York: Pergamon.

Schmidt, M.R. (2000). You know more than you can say: In memory of Donald A. Schön (1930-1997). *Public Administration Review, 60*(3), 266-275.

Schön, D.A. (1983). *The reflective practitioner: How professionals think in action*. New York: Basic Books.

Schön, D.A. (1987). *Educating the reflective practitioner*. San Francisco: Jossey-Bass Publishers.

Schön, D.A. (1991). Introduction. In D.A. Schön (Ed.), *The reflective practitioner: Case studies in and on educational practice* (pp. 1-12). New York: Teachers College Press.

Schuwirth, L.W.T., Blackmore, D.E., Mom, E., van den Wildenberg, F., Stoffers, H.E.J.H., & van der Vleuten, C.P.M. (1999). How to write short cases for assessing problem solving skills. *Medical Teacher*, *21*(2), 144-150.

Selinger, M. (2001). Setting authentic tasks using the internet in schools. In M. Leask (Ed.), *Issues in Teaching using ICT* (pp. 96-104). London: Routledge Falmer.

Sfard, A. (1998). On two metaphors for learning and the dangers of choosing just one. *Educational Researcher*, *27*(2), 4-13.

Shulman, L. (1998). Teacher portfolios: A theoretical activity. In N. Lyons (Ed.), *With portfolio in hand* (pp. 23-37). New York: Teachers College Press.

Shulman, L.S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher, 15*(2), 4-14.

Siegle, D. (2002). Creating a living portfolio: Documenting student growth with electronic portfolios. *Gifted Child Today Magazine*, *25*(3), 60-64.

Skaalid, B. (2007). *A developmental study concerning the design and implementation of constructivist learning environments.* (Doctoral dissertation, University of Alberta, Canada, 2007). Dissertation Abstracts International, 68, 08A.

Smyth, B., & McKenna, E. (1998). Modelling the competence of case-bases. In P. Cunningham, & B Smyth (Eds.), *Advances in case-based reasoning: 4th European workshop on case-based reasoning, EWCBR-98,* (September 23-25, Dublin, Ireland) (pp. 208-220). Berlin: Springer.

Spiro, R.J., & Jehng, J-C. (1990). Cognitive flexibility and hypertext: Theory and technology for the nonlinear and multidimensional traversal of complex subject matter. In D. Nix, & R.J. Spiro (Eds.), *Cognition, education, and multimedia: Exploring ideas in high technology* (pp. 163-205). Hillsdale, NJ: Lawrence Erlbaum.

State, Territory and Commonwealth Ministers of Education (1999). *The Adelaide declaration on national goals for schooling in the twenty-first century.* Meeting of the Ministerial Council on Education, Employment, Training and Youth Affairs (MCEETYA) (10th Adelaide, April 22-23).

Staudt, D., & Fuqua, D. (2000). *Using videotape technology as a tool to enhance the transformation of preservice teachers into practicing teachers*. Paper presented at the Society for Information Technology and Teacher Education International Conference (11th, San Diego, CA, February 8-12).

Stefanakis, E.H. (1997). The power in portfolios: “A way for sitting beside” each learner. In B. Torff (Ed.), *Multiple intelligences and assessment: A collection of articles* (pp. 79-84). Arlington Heights, Illinois: Skylight.

Stiggins, R. J. (2002). Assessment crisis: The absence of assessment FOR learning. *Phi Delta Kappan*, *83*(10), 758-764.

Summit, R.K. (1987). Online information: A ten year perspective and outlook. *Online,11*(1), 61-64.

Szabo, M. (2001). *The information revolution and the future role of educators*. Paper presented at the Society for Information Technology in Education International Conference (12th, Orlando, FL, March 5-10). Hillsdale, NJ: Lawrence Erlbaum.

Taylor, P. C., Fraser, B. J. & Fisher, D. L. (1997) Monitoring constructivist classroom learning environments. *International Journal of Educational Research, 27*(4), 293-302.

Teachers lap up digital learning. (2008). *Education Views, 17*(7), 16.

Technology in Schools Task Force (2003). *Suggestions, tools, and guidelines for assessing technology in elementary and secondary education*. Retrieved August, 2008, from the National Center for Education Statistics Web site: http://nces.ed.gov/pubs2003/tech_schools/

Tinkler, D., Lepani, B., & Mitchell, J. (1996). *Education and technology convergence: A survey of technological infrastructure in education and the professional development and support of educators and trainers in information and communication technologies.* Canberra: Australian Government Publishing Service.

Tosh, D., & Werdmuller, B. (2004a). *ePortfolios and weblogs: One vision for ePortfolio development.* Retrieved October 1, 2004, from http://www.eradc.org/papers/ePortfolio_Weblog.pdf

Tosh, D., & Werdmuller, B. (2004b). *Creation of a learning landscape: Weblogging and social networking in the context of e-portfolios*. Retrieved October 1, 2004, from http://www.eradc.org/papers/Learning_landscape.pdf

Tucker, G.R., & Batchelder, A. (2000). *The integration of technology into a constructivist curriculum: Beyond PowerPoint*. Paper presented at the Society for Information Technology in Education International Conference (11th, San Diego, CA, February 8-12).

Vosniadou, S. (1996). *Learning environments for representational growth and cognitive flexibility*. In S. Vosniadou, E de Corte, R. Glasser, & H. Mandl (Eds.), *International perspectives on the design of technology-supported learning environments* (pp. 13-23). Mahwah, NJ: Lawrence Erlbaum.

Walker, D., & Lambert, L. (1995). Learning and leading theory: A century in the making. In L. Lambert, D. Walker, D.P. Zimmerman, J.E. Cooper, M.D. Lambert, M.E. Gardner, & P.J. Slack, *The constructivist leader* (pp. 1-27). New York: Teachers College, Columbia University.

Wang, F-K., Jonassen, D.H., Strobel, J., & Cernusca, D. (2003). Applications of a case library of technology integration stories for teachers. *Journal of Technology and Teacher Education, 11*(4), 547-566.

Watson, G., & Prestridge, S. (2003). A networked learning community approach to sustain teacher ICT professional development. *Australian Journal of Educational Technology, 19*(2), 227-240.

Watson, I., & Marir, F. (1994). Case-based reasoning: A review. *The Knowledge Engineering Review, 9*(4), 355-381.

Welch, D.L. (2007). *A constructivist approach to professional development for public school principals*. (Doctoral dissertation, The Fielding Institute, 2007). Dissertation Abstracts International, 58, 03A.

Wenger, E., McDermott, R., & Snyder, W. (2002). *Cultivating communities of practice: A guide to managing knowledge.* Boston MA: Harvard Business School Press.

Wiedmer, T.L. (1998). Digital portfolios. *Phi Delta Kappan, 79*(8), 586-589.

Williams, M. (2005). *Case Studies and Research into Planning Models of Professional Learning Programmes.* Canberra: Australian Government Quality Teacher Programme (AGQTP).

Williams, S. M. (1992). Putting case-based instruction into context: Examples from legal and medical education. *The Journal of the Learning Sciences, 2*(4), 367-427.

Wilson, B.G. (1995a). Introduction: What is a constructivist learning environment? In B.G. Wilson (Ed.), *Constructivist learning environments: Case studies in instructional design* (pp. 3-8). Englewood Cliffs, NJ: Educational Technology Publications.

Wilson, B.G. (1995b). Metaphors for instruction: Why we talk about learning environments. *Educational Technology*, *35*(5), 25-30.
Wilson, B.G., & Myers, K.M. (1999). Situated cognition in theoretical and practical context. In D.H. Jonassen, & S.M. Land (Eds.), *Theoretical foundations of learning environments* (pp. 57-88). Mahwah, NJ: Lawrence Erlbaum.
Winn, W. (1991). A constructivist critique of the assumptions of instructional design. In T.M. Duffy, J. Lowyck, & D.H. Jonassen (Eds.), *Designing environments for constructive learning* (pp. 189-212). Berlin: Springer-Verlag.
Woolley, M., & Pigdon, K. (1997). Inquiry learning. In P. Griffin, & P. Smith (Eds.), *Outcome-based education: Issues and strategies for schools* (pp. 30-31). Canberra, ACT: Australian Curriculum Studies Association.
Yin, R.K. (1984). *Case study research: Design and methods*. Beverly Hills, CA: Sage.

Appendix A: Sources of New Information to Confront Principals' Beliefs

This figure was developed in a previous study by the researcher (Otto, 2003). The study proposed that principals would take on new beliefs about teaching with ICTs if they were involved in activities based on four sources of information to enhance self-efficacy (Bandura, 1986). The Professional Development Framework in appendix B also recommends that activities are based on the four sources of information.

Table A.1: Sources of New Information to Confront Principals' Beliefs

EXISTING PROCESSES

Barriers to Principals Developing New Beliefs about Teaching with ICTs

a. Dilemma of old and new worlds co-existing and need to balance print based and ICT based pedagogy
b. Focus on building ICT infrastructure and attending to management issues rather than pedagogy
c. Demands of school management issues
d. Introduction to ICTs late in life and personal interest in ICTs limited to tasks at work
e. Limitations in vision of teaching with ICTs, knowledge of educational software, and pedagogical knowledge
f. Paucity of exemplars of teaching with ICTs
g. View of knowledge as static and limited understanding about the management of knowledge with ICTs
h. Beliefs about teaching e.g., children's choices, focus on teaching basic knowledge

Existing Sources of Information that Influence Beliefs about Teaching with ICTs

Enacting	Observing
a. Past experience as a teacher b. Fragmented teaching experiences while releasing teachers for non-contact time, taking classes for absent teachers, and meeting teacher requests for assistance	a. Sporadic observations of effective and ineffective teachers in own school based on personal understanding and beliefs about the principles of effective teaching
Being Persuaded	**Affective State**
a. Education Qld mandates and policy b. Few opportunities and limited interest in Professional Development c. School Opinion Survey d. Professional conversation with teachers and discussions with parents and community	a. Perceived needs of children, including own children b. Limited confidence and experience in teaching with ICTs, using ICTs, and using educational software

Existing Beliefs about Teaching with ICTs

NEW BELIEFS CONFRONT EXISTING BELIEFS
New Stories To Share With Teachers in Professional Conversation

New Beliefs about Teaching with ICTs

Enacting	Observing
a. At own school, co-operatively plan and teach a unit of work that makes use of ICTs b. Participate in an electronic learning project at an Education Qld Centre of Excellence c. Trial educational software to become familiar with objectives and content d. Seek and engage in professional development opportunities e.g., the Caring Intellectual Leadership Model (Rettig et al., 2000)	a. Observe teaching with ICTs in own and other schools b. Visit work places and tertiary institutions to observe use of ICTs and discuss expectations of school graduates c. Visit high schools to observe use of ICTs and discuss expectations of children leaving year 7 d. Visit model schools e.g., Teacher Development Centre, Woodcrest College e. Actively seek exemplars e.g., videos of practices, journal articles, The Learning Place and other web sites
Being Persuaded	**Affective State**
a. Read and reflect on the requirements, purpose and implications of Education Qld mandated policy b. Collaborate and network with peers to share stories c. Engage in processes to promote congruency between beliefs, principles, and practices (Atkin, 1996) d. Engage in processes to challenge beliefs (Carlson, 1994) e. Seek opportunities to identify and reflect on one's beliefs f. Compare exemplars e.g., videos, continua of effective teaching with ICTS, with own beliefs and practices	a. Become comfortable in using ICTs by seeking support from competent staff, private providers and courses, own children, experimentation and play, and troubleshooting b. Share stories of successes and challenges with other principals c. Take small steps in order to make the larger gains d. Aim to go beyond concerns about management issues and resources to create new uses for existing ICTs e. Seek to verify personal beliefs about what is in the interests of children

New Sources of Information that Influence Beliefs about Teaching with ICTs

a. Environment for change supported by State and National Government policy
b. Education Qld initiatives and mandated policy including an Integrated Outcomes Based Curriculum Framework, new syllabi e.g., focus on lifelong learning, Literate Futures Project, Management and Learning Technology Plans, Minimum Standards for Teachers: Learning Technology, and Information and Communications Technology Continua
c. Concern for the needs and interests of children and the development of responsible and successful citizens

Conditions that Favour Principals Developing new Beliefs about Teaching with ICTs

NEW PROCESSES

(Otto, 2003)

Appendix B: Professional Development Framework

1. Facilitators' Action Plan

Table B.1: Facilitators Action Plan

Expand the spaces below each series of questions to enter responses.

Project Title	
Purpose	
Participant Groups	
Co-ordinator Location/Contact Details	

Phase 1: Investigate and Plan Activities - Design The Constructivist Learning Environment		
1.1 The Issue and the Context		
1.1.1 The Issue		
What is the issue?	Why is the issue important?	What data supports the importance of the issue?
1.1.2 The Changes		
What are the new practices?	How are the new practices different?	How do the new practices fit the context?
1.1.3 The Learners		
Who are the learners?	What beliefs do the learners hold that will impact on the implementation of the new practices?	What skills and experiences do the learners have and need to implement the new practices?
1.1.4 Engaging the Learners		
What is so compelling about the issue that will engage the learner, i.e., what does the learner gain?	How will the learner be encouraged to engage with the issue?	How will learner engagement be sustained?
1.1.5 The Context of the Professional Development		
Where will the learning take place and how will this impact on the learning?	What aspects of the learners' work places will impact on the learners' capacity to learn?	
1.2 Related Cases		
How will learners access similar cases?	How will learners be encouraged to use the principles of Case Based Reasoning?	How will the new cases be recorded, stored, and accessed?
1.3 Information Resources		
What information will learners need?	How will learners access information at a time of their choosing?	What support will learners need to understand the information and how it should be used?
1.4 Tools		
What <u>Physical Tools</u> will learners use?	How will learners develop skills in these tools?	

What <u>Thinking Tools</u> will the learners use?	How will learners develop skills in these tools?	
What <u>Communication Tools</u> will learners use?	How will learners develop skills in these tools?	

1.5 Social and Contextual Support		
What factors will impact on implementation?	What support will learners need?	Who will provide learner support?

1.2 Plan Activities			
Activity	Costs	Timeline	Data Collection Processes

Phase 2: Trial, Reflect, and Modify - Evaluate activities with a group of learners		
Is the assessment of activities workable and what changes need to be made?	Are the activities workable and what changes need to be made?	Will the activities achieve the desired learning outcomes?
Is the assessment of learning outcomes workable and what changes need to be made?	Will the learning outcomes have the desired effect on practices?	
Phase 3: Implement and Reflect - Evaluate the effectiveness and efficiency of the project		
How <u>effective</u> was the project in changing practices?	How <u>efficient</u> was the project in changing practices?	What are the recommendations for future planners of similar projects?
Phase 4: Sustain and Monitor - Sustain learning and changes in practices		
What needs to happen to sustain learning?	What needs to happen to sustain changes in practices?	What were the benefits to the organisation?

2. Information for Project Facilitators

1. Principles

a. Changing Practices
   i. The purpose of a learning project is to engage teachers in an issue so that teaching practices are changed. The learner is supported through the dissemination of information, the development of skills, and access to cases.

b. Changing Beliefs
   i. Practices do not change unless teachers change their beliefs about how a task should be carried out. Changing beliefs is difficult, and teachers need compelling reasons for change.

c. Complex Tasks
   i. Teachers deal with complex tasks. There are no easy solutions and a single in-service session is a waste of time and resources. Simple solutions do not work for complex issues.

d. Project Planning Committee
   i. A small planning committee needs to be established for each project with at least one person prepared to enact and follow up decisions. The committee needs to be committed to the goals of the project and to sustaining learning over an extended period of time, even after initial funding is expended and others have moved on.

e. Instructional Design of Projects
   i. A Constructivist Learning Environment (CLE) is an instructional design that allows the planning committee to create an environment in which teachers are supported as they engage with the issue. The planning committee uses the checklist of questions to ensure that all aspects of the learning environment are considered. Activities are then designed to meet the needs of teachers in the learning environment.
   ii. Teachers are encouraged to take responsibility for their own learning and to use their learning to solve problems in their classrooms.

f. Meta-Cognition
   i. Teachers need to be aware of how they are learning and encouraged to apply the same processes in their classrooms. Activities are included that make teachers aware of the design of the Constructivist Learning Environment so that they can apply the same principles in their classroom.

2. A Constructivist Learning Environment (CLE)

a. The Issue
   i. The planning committee, the instructors, and the learners need to understand the issue, the learners, the context, and the intended changes in practices.

b. Related Cases
   i. A case in the form of a story or image records how teachers implemented new practices in their classrooms. Other teachers can see practices they may not have previously considered and can see the effects of new practices. Teachers like to see and hear what is happening in other classrooms. It is a way of measuring their own progress, and reassures them that what they are doing is appropriate.
   ii. Viewing and using cases to solve a problem is part of an important learning process called Case Based Reasoning (see below). Cases also contribute to organisational memory, so that what is achieved is retained for future use. Cases need to include descriptions of the classroom and school so that similarities and contrasts can be recognised.
   iii. <u>Context, issue, and solution</u>: Provide enough detail about the context, issue, and solution so that the reader can interpret similarities and contrasts with their own context and issues. For a case to be meaningful, the reader has to identify with the situation. It is easier to enact a practice after seeing someone perform the practice.
   iv. <u>Format</u>: Visual aids such as a photo or short video clip are powerful and provide a lot of information quickly. Videos can be a problem if children are identifiable, which may not be appropriate even with parental permission. In photos, the faces of individuals can be “brushed” to prevent identification. A story, perhaps supported by photos, is an old but reliable format. Do not write too much or too little. A vignette of half a page and a few photos on the rest of the page is often sufficient. A video of a teacher talking about their work is a powerful format that eliminates the problem of showing children. Viewers respond to the enthusiasm, language, and personal touches of a real person.
   v. <u>Storing and Accessing Cases</u>: Devise several strategies to store and access cases so that teachers may choose a method that suits them best. For example, a PowerPoint presentation or a webpage can be created with a brief explanation of each case and a hyperlink to the case. The presentation or web page can be uploaded to the school’s Intranet or Internet web site or to an online project room and saved to a CD-ROM for copying and distribution. The cases can be compiled in a booklet with an introduction about the context, the issue, the new practices, and the effect of the new practices.

c. Case Based Reasoning
   i. Means reasoning based on previous cases or experiences, and applying remembered cases to suggest a way of solving new problems. There are four steps.
   ii. <u>Retrieve</u>: Access a case that demonstrates a solution to a problem similar to the one encountered.
   iii. <u>Reuse</u>: Apply the solution in the case and own experience to solve the problem.
   iv. <u>Revise</u>: - When the problem is solved, a new case has been created.
   v. <u>Retain</u>: - Store the new case for other people to access.

d. Information Resources
   i. Teachers need to access information at any time, e.g., while engaged in learning or working in their classrooms. Teachers need support in understanding and applying information.

e. Tools
   i. Teachers use tools in their classrooms and to support their learning. Teachers may need to develop their skills in using new tools. There are three types of tools.
   ii. <u>Physical Tools</u>: Objects used to perform a task, e.g. sporting, science, maths, or manual arts equipment, library resources, art materials, and ICTs.
   iii. <u>Thinking Tools</u>: Help to visualize, organize, automate or think about new practices, e.g., a mind map, a wall chart, a set of steps, a contents page, and an index. Thinking tools also enhance performance and information gathering, e.g., word processor, data base, spread sheet, the Internet, library, scanner, camera, and calculator.
   iv. <u>Communication Tools</u>: Enable communication when face-to-face meetings are not possible or convenient, e.g., email, email discussion groups, letters and notes, video links, telephone, telephone conferencing, tape recorders, and video recorders.

f. Support
   i. Solving problems by implementing new practices involves taking risks because the new practices are unfamiliar, and teachers may be uncertain of the processes and results.
   ii. Teachers do not have to "do it alone," and are more effective if they work as a team. They need to be encouraged to seek support and to support others by collaborating with colleagues, supervisors, and facilitators. For example they may email a colleague or facilitator, contribute to a distribution list, mentor a colleague, organise a school based workshop, develop action learning plans, organise regular face to face meetings, or visit the online project room.
   iii. Teachers may need support from within their school, such as time off to learn and to develop processes, additional resources, and an understanding supervisor. ICTs may assist communication and collaboration processes.

3. The Professional Development Framework

a. Project Phases
   i. There are four phases in the design, implementation, and sustaining of a learning project. An action plan of questions is provided to record planning and evaluation throughout the four phases, which may take a year or longer.
   ii. <u>Phase 1 - Investigate and Plan Activities</u>: Information is collected to describe the issue, the changes in practice, the learners, how learners will be engaged in the issue, the context for learning, related cases, information resources, tools, and support. Activities are designed to establish and maintain the learning environment.
   iii. <u>Phase 2 - Trial, Reflect, and Modify</u>: A group of learners engage in the activities. The activities, the learning outcomes, and changes in practice are evaluated and activities modified.
   iv. <u>Phase 3 - Implement and Reflect</u>: All potential learners are engaged in the activities. The effectiveness and efficiency of the project is evaluated.
   v. <u>Phase 4 - Sustain and Monitor</u>: Learning and changes in practice are sustained. Benefits to the organization are evaluated. Recommendations are generated for other projects.

b. Activity design
   i. A single activity may address more than one element of the learning environment. For example, a workshop may include the presentation of cases, access to information, and the use of tools. Each element of the learning environment should be addressed in more than one way. For example, cases may be stored at The Learning Place online project room, presented at a workshop, or mailed to schools as a CD-ROM.

c. Learner Confidence
   i. Teachers need to have confidence that the changes they make in their practices will make a difference. Teacher confidence can be improved if activities include the following.
   ii. <u>Seeing</u>: observing others perform the practice.
   iii. <u>Hearing</u>: persuading the learner how and why the new practice will make a difference.
   iv. <u>Doing:</u> enacting the practice themselves with meta-cognitive reflections and modifications.
   v. <u>Caring</u>: attending to the affective needs of the learner (comfort, feelings).

d. Data collection processes
   i. Information needs to be collected about the appropriateness of activity, learning outcomes (new knowledge and skills), changes in practice at the workplace, effectiveness and efficiency of the project as a whole, and sustainability of the project, the learning, and changes in practices.

3. Participant Action Plan

Table B.2: Participant Action Plan

Project	
Name	
School	

Expand the spaces below each series of questions to enter responses.

Investigate & Plan			
The Issue	Significance Of The Issue	Changes In Practice	Organisational Fit
What is the Issue?	Why is this issue important? What data supports the importance of the issue?	What will I need to do that is different? How is this different to what I have done before? How do the changes fit my context? What are the underlying principles?	How do the changes fit with other considerations? Productive Pedagogies, PST, MPOL, EPOL, policy guidelines, etc.
Trial, Reflect, & Modify			
Resources	Support	Strategies & Actions	Reflections
What information will I need? How will I access information? How will I access cases of the issue being resolved? What new tools will I be using? (see back page) How will I develop my skills in the new tools?	Who will I work with? (see back page) Who will provide support?	What steps do I take to trial the changes in practice?	What worked and didn’t work? Why? How will I know the changes in practice made a difference? Data? Did the changes in practice during the trial make a difference in my context?
Implement & Reflect			
Modified Resources	Modified Support	Modified Actions	Reflections
What other information do I need to change practices? Is my access to information and cases adequate? Am I managing the new tools adequately? How can I improve my skills in the use of tools?	Am I getting adequate support?	What steps do I take to implement the changes in practice?	How will I know the changes in practice made a difference? Data? Did the changes in practice make a different in my context?

Sustain & Share		
Sustain	Share	Timeline
How can I ensure the changes will be sustained?	How will I share my knowledge and experiences with my colleagues? (see “Cases” and “Support” on the back page)	When can I do this?

4. Information for Project Participants

1. Constructivist Learning Environment (CLE)
    i. A learning environment is designed to support you as you engage with an issue to solve a problem. Solving problems means changing practices. A learning environment has five elements.

a. The Issue
    i. Investigate the issue, yourself as a learner, your context, and the intended changes in practices.

b. Cases
    i. A case in the form of a story or image records how you implemented the new practices in your work place. By sharing cases, people can see practices they may not have previously considered and can see the effects of new practices. Cases need to include descriptions of the work place so that similarities and contrasts can be recognised.

  ii. Case Based Reasoning is a reasoning process in which cases are accessed to solve problems (retrieve, reuse, revise, retain).

c. Information Resources
  i. Access to information is required at the appropriate time, e.g., while engaged in learning about the issue, and before, during, and after implementing the new practices. Support may be needed in understanding and applying information.

d. Tools
  i. Tools are used in the work place and to facilitate learning. Support may be needed in developing skills in using new tools.

e. Support
  i. Solving problems by implementing new practices involves taking risks because the new practices are unfamiliar. We may be uncertain of the processes and results. Seek support and support others by collaborating with colleagues, supervisors, and facilitators.

2. Cases
  i. We like to see and hear what is happening in other work places. It is a way of measuring our own progress, and reassures us that what we are doing is appropriate. Viewing and using cases to solve a problem is part of an important learning process called Case Based Reasoning. Cases also contribute to organisational memory, so that what we achieve is retained for future use.

a. Preparing Cases
  i. <u>Context</u>: Provide enough detail about your context so that the reader can interpret similarities and contrasts with their own context. For a case to be meaningful, the reader has to identify with your situation.
  ii. <u>Issues and solutions</u>: Similarly, the reader needs to be presented with enough information to identify with your issues and solutions. It is easier to enact a practice if you have seen someone perform the practice.
  iii. <u>Format</u>: Cases provide viewers with perspectives they may not have considered. Visual aids such as a photo or short video clip are powerful and provide a lot of information quickly. Videos can be a problem if children are identifiable, which may not be appropriate even with parental permission. In photos, the faces of individuals can be “brushed” to prevent identification. A story, perhaps supported by photos, is an old but reliable format. Do not write too much or too little. A vignette of half a page and a few photos on the rest of the page is often sufficient. A video of a teacher talking about their work is a powerful format that eliminates the problem of showing children. Viewers respond to the enthusiasm, language, and personal touches of a real person.

b. Storing and Accessing Cases
  i. Having several strategies to store and access cases allows the viewer to use a method that suits them best.
  ii. A PowerPoint presentation or a web page can be created with a brief explanation of each case and a hyperlink to the case.
  iii. The presentation or web page can be uploaded to the school’s Intranet or Internet web site or to an online project room and saved to a CD-ROM for copying and distribution.
  iv. Cases can be compiled in a booklet with an introduction about the issue, the context, the new practices, and the effect of the new practices.

c. Case Based Reasoning
  i. Means reasoning based on previous cases or experiences, and applying remembered cases to suggest a way of solving new problems. There are four steps.
  ii. <u>Retrieve</u>: Access a case that demonstrates a solution to a problem similar to the one you are encountering.
  iii. <u>Reuse</u>: Apply the solution in the case and your own experience to solve the problem.
  iv. <u>Revise</u>: When the problem is solved, a new case has been created.
  v. <u>Retain</u>: Store the new case for other people to access.

3. Tools
  i. Tools are used in our everyday work and help us to learn how to implement new practices.
  ii. <u>Physical Tools</u>: Objects used to perform a task, e.g. sporting, science, maths, or manual arts equipment, library resources, art materials, and ICTs.
  iii. <u>Thinking Tools</u>: Help to visualize, organize, automate or think about new practices, e.g., a mind map, a wall chart, a set of steps, a contents page, and an index. Thinking tools also enhance performance and information gathering, e.g., word processor, data base, spread sheet, the Internet, library, scanner, camera, and calculator.

iv. Communication Tools: Enable communication when face-to-face meetings are not possible or convenient, e.g., email, email discussion groups, letters and notes, video links, telephone, telephone conferencing, tape recorders, and video recorders.

4. Support

i. We don't have to do it alone and we are more effective if we work as a team. ICTs can support our learning and changes to practices, but we also need to involve other people.
ii. Examples of ways to access support and to support others include email a colleague or facilitator, contribute to a distribution list, mentor a colleague, organise a school based workshop, develop action learning plans, organise regular face to face meetings, or visit the online project room.

Appendix C: *ePortfolio Project* Instruments

1. Workshop Survey

At the conclusion of each workshop, participants were asked to complete a questionnaire similar to the one below.

Table C.1: Workshop Survey

Australian Government
Quality Teacher Programme

ePortfolio Alliance

Facilitating ePortfolios to improve
curriculum, pedagogy, assessment, and reporting
through the integration of ICTs in learning.

Feedback for May 25, 2005
To help us plan to meet your needs

Session	Usefulness	Comments
Helidon: Whole school	1 2 3 4 5	
Wilsonton: Movie Maker	1 2 3 4 5	
Pilton: Photo Story 3	1 2 3 4 5	
Tick Session Attended ○ Movie Maker Intro ○ Movie Maker Advanced ○ Web Cam	1 2 3 4 5	

Suggestions for the next session	
Tell us about your progress with ePortfolios	

<u>Return to</u>
Dr T.L. Otto
Principal, Withcott State School
Phone 46149333 Fax 46149300
tom.otto@eq.edu.au

Supported and funded by
- *Education Queensland (Toowoomba & Darling Downs Districts)*
- *Australian Government Quality Teacher Programme*
- *Toowoomba Technology Mathematics & Science Centre of Excellence*

2. Survey of Project Managers and Principals

a. Details
   i. Principals and project managers of schools receiving funds to release teachers to develop ePortfolio frameworks completed the following surveys.

b. Instructions for Project Managers
   i. Below is a questionnaire for *ePortfolio Project* managers at schools that received ePortfolio Alliance funding. A different questionnaire has been forwarded to principals to gain their perspective. Responses from the two questionnaires will serve a number of purposes. First, they will be used for the funding evaluation report. Second, they will be used to support applications for future funding. Third, they will form the basis for a written "case" for sharing with other schools. Fourth, they will play a key role in the data collection process for my PhD research project. The journal articles and conference papers generated from the study will ensure that the groundbreaking work of those involved in the ePortfolio Alliance will be recognised and will serve to guide other teachers and school administrators.
   ii. Any material that you have used or created relating to ePortfolios would also be very much appreciated. For example, notes to staff, plans, presentations, and samples of ePortfolios.
   iii. To enable me to use your responses and other material in my dissertation, I need the written permission of yourself and the school principal. Consent letters will be forwarded by mail and a signed copy kept by each party. Studies such as this one are monitored by the University of Southern Queensland (USQ) Ethics Committee. I will also forward a copy of Education Queensland's approval to conduct the study. Please contact me if you require clarification of any aspect of the consent letter or the project in general.
   iv. Please be aware that people and schools are identified unless I am instructed otherwise. This is so that the great work that has been achieved by individuals and schools is recognised. No names or identifying images of children will be used in the dissertation or reports. You will be given a copy of the information that relates to you or your school for you to check and verify. If you decide at that point to remain anonymous, then this can be arranged.
   v. Below are some suggestions for completing this questionnaire. This is a key piece of data for my work, and I very much appreciate the time given to its completion.
   vi. Read all of the questions first to see where everything fits in.
   vii. If headings do not fit with what you want to say then change or add to them.
   viii. Do not worry about using whole sentences as notes are fine.
   ix. Try to include as much information as possible - there are no word limits. The reasons why you have acted in certain ways and what has motivated you are very important.
   x. You may talk about what you have been doing personally or what you have observed in your school.
   xi. Keep on going back to the questionnaire as you think of more things to add.
   xii. If you would prefer to respond with handwritten notes, please expand rows, print, and post or fax back.
   xiii. There is no fixed date for return, but by the second or third week of term 3 would be great. Thank you for completing this questionnaire. (contact details provided)

c. Types of ePortfolios
   i. There are three types of ePortfolios depending on the purpose intended. ePortfolios may also represent a mix of these types.
   ii. <u>Summative</u>: (monitoring tool for the teacher, formal evaluation process) Collection of student work, tracks progress
   iii. <u>Formative</u>: (learning tool for the user) Students collect, organise, and reflect on their work
   iv. <u>Marketing</u>: (celebration and employment) Used in primary and secondary schools to celebrate individual or class achievements. School leavers could produce a marketing ePortfolio as a culminating activity for employment or entry to tertiary education.

d. Questions for Project Managers
   i. Questions to elicit school name; person completing report, and date.
   ii. What is your context? (Any information that describes your school or class e.g., size of school, age of children, school and/or class characteristics, staffing arrangements etc.).
   iii. What are your purposes for using ePortfolios? What do you want to achieve?
   iv. What types of ePortfolios have you created to meet this purpose? (see list below)
   v. What hardware was used?
   vi. Were there problems procuring hardware and how did you resolve those problems?
   vii. Were there problems with the use of hardware and how did you resolve those problems?
   viii. What software was used to organise the collection of children's work (ePortfolio)? Why?
   ix. How have you structured your ePortfolios?
   x. What software was used to create individual pieces of children's work (artefacts)? Why?
   xi. What items have been included in the children's ePortfolio?

xii. What role has student reflections taken in your ePortfolios and how has this been achieved?
xiii. How have your ePortfolios changed over time and why?
xiv. What assistance and training was required for teachers? (Who, How, When, Where)
xv. What assistance and training was required for children (Who, How, When, Where)
xvi. What other resources were used?
xvii. Who views the ePortfolios? How? When? Where?
xviii. What other management issues have arisen and how have you solved those issues?
xix. What changes have you observed in teaching practices?
xx. What conversations have been generated among teachers, parents, and children?
xxi. What examples from other schools have influenced your thinking about ePortfolios?
xxii. How have you shared your work with others?
xxiii. How have you used the funds provided by the ePortfolio Alliance?
xxiv. What needs to happen for the development of ePortfolios to progress further in your school?
xxv. How useful were the sharing sessions at Wilsonton Campus?
xxvi. How useful were the skill development sessions at Wilsonton Campus?
xxvii. How useful was the information booklet (ePortfolios: A learning tool by T. Otto)?
xxviii. How useful was The Learning Place Project Room?
xxix. How useful was the email discussion list?
xxx. How useful was the list of web sites?
xxxi. Were you aware of the design of the professional learning applied in the project? Do you think this design would be useful for other professional learning?
xxxii. Do you have any other comments about the professional learning that has occurred in the project?
xxxiii. Do you have any suggestions about how professional learning in the project could be enhanced?
xxxiv. Do you have any other suggestions or comments?

e. Questions for Principals
  i. Questions to elicit school, person completing report, and date.
  ii. The project manager is providing a description of the context. Is there any information about the context that you wish to add from a principal's perspective?
  iii. What is your vision for ePortfolios in your school?
  iv. What items would you like to see included in student ePortfolios?
  v. What issues relating to the implementation of ePortfolios have you addressed as principal? How did you resolve those issues?
  vi. What changes have you observed in the practices of teachers using ePortfolios?
  vii. What conversations have been generated among teachers, parents, and children?
  viii. What conversations have you had with others about ePortfolios?
  ix. What examples from other schools have influenced your thinking about ePortfolios?
  x. How have you accessed information about ePortfolios?
  xi. Were you aware of the design of the professional learning applied in the project? Do you think this design would be useful for other professional learning?
  xii. Do you have any comments about the professional learning that has occurred in the project?
  xiii. Do you have any suggestions about how professional learning in the project could be enhanced?
  xiv. What needs to happen for the development of ePortfolios to progress further in your school?

Appendix D: *ePortfolio Project* Activities

1. Introduction

a. The *ePortfolio Project* was initiated by the researcher in the Toowoomba and The Downs Education Districts, in Queensland, Australia. During the period of the study, the researcher was the principal of Withcott State Primary School in the Toowoomba Education District.
b. A planning committee was established following an inaugural meeting in May, 2004 of teachers and school administrators interested in developing ePortfolio frameworks.
c. Appendix D is a record of the meetings of the planning committee and the activities initiated to support the network of learners interested in ePortfolios.
d. Preschools in Queensland were replaced at the end of 2006 with a preparatory year of schooling. Reference is made to both preschools and the preparatory year in the report.

2. List of Named Participants

a. Details
   i. Table D.1acknowledges the hard work and commitment of the many people who took an active role in the project through their support, development of ePortfolio frameworks, presentation of cases and workshops, or contribution to planning.
   ii. The list also provides a reference to participants named in the report.
   iii. Approximately 400 other participants attended workshops and forums, implemented ePortfolio frameworks, or provided anonymous feedback.

Table D.1: List of Named Participants

Location & Enrolment	Name	Position	Role
University of Southern Queensland	T. Otto	Principal Researcher	Designed and managed the project; attended planning meetings; visited sites to provide information about ePortfolios; wrote research report and papers; collated CD-ROM and information booklet
Withcott Primary 270	T. Otto	Principal	Managed the implementation of ePortfolios at the school
	S. Denman	Teacher Librarian Teacher from 2006	Not funded but implemented ePortfolios & contributed case
	T. Dempsey	Teacher	Not funded but implemented ePortfolios & contributed case
Toowoomba District Office	N. Thorpe	Principal Education Officer (Performance Measurement)	From 2006 Principal Advisor Education Services at The Downs Education District Office; attended planning meetings; actively supported the project at district office, e.g., advised of fund sources, forwarded information schools
The Downs District Office	M. Smith	Principal Education Officer (Performance Measurement)	From 2006 Principal Advisor Education Services at Toowoomba Education District Office; attended planning meetings; actively supported the project at district office
Gatton Primary	G. St Clair	Principal	Attended planning meetings
	D. Hacker	Teacher	Developed an ePortfolio framework early in the project presented as a case
Pilton Primary	S. Fuller	Principal	Not funded but implemented ePortfolios & contributed case; attended planning meetings; presented Photo Story at workshops, which proved to be very successful
Helidon Primary	L. Eilers	Principal	School project manager; funded to implement ePortfolios & contributed case; attended planning meetings
Glenvale Primary	T. Russell	Principal	Supported the project
	L. Brosnan	ICT Co-ordinator	School project manager; funded to implement ePortfolios & contributed case
Wilsonton Primary	L. Hill	Principal	Supported the project
	T. Mancktelow	Deputy Principal	School project manager; funded to implement ePortfolios & contributed case; attended planning meetings
Centenary Heights High	M. Walsh	Principal	Supported the project
	M. Haberman	HOD	School project manager; funded to implement ePortfolios; held an ePortfolio open day with year 8 class
Clifford Park Special	A. Hawke	Principal	Supported the project
	C. Searchfield	Deputy Principal	School project manager; funded to implement ePortfolios & contributed case; attended planning meetings
Woodcrest College		Teachers	N. Thorpe and T. Otto attended a workshop at Woodcrest on ePortfolios at the beginning of the project; invited the teachers to present their work as a case
Pozieres Primary	A. Fenney	Principal	Developed an ePortfolio framework before the project commenced, which was presented as a case
Crow's Nest P-10	L. March	Principal	Supported the project
	B. Butler	Teacher	Attended the inaugural meeting and created a major project from the concept that was included in the CD-ROM; presented case at Workshops
Toowoomba High	C. Zilm	Principal	Arranged funding through TTMSCE; adopted the Workforce learning Framework for "Success for Boys" project
	C. Lapworth	Art teacher	Presented workshops each term in skill development; travelled to Chinchilla SHS with T. Otto to present workshops
	A. Smith	Art teacher	Presented workshops each term in skill development
	B. Dittman	Co-ordinator TTMSCE	Arranged funding through TTMSCE; supported the project; co-ordinated sessions at Science and Technology Forum
	T. Angus	Co-ordinator TTMSCE & The Learning Place	Attended planning meetings; arranged funding through TTMSCE; supported the project; co-ordinated sessions at Science and Technology Forum; significant contribution to collation of CD-ROM

3. Funding Submission to TTMSCE (November, 2003)

a. Details

   i. A cluster meeting of four principals in the Lockyer Valley, an eastern section of the Toowoomba Education District, was held at Helidon State Primary School in October, 2003. T. Otto proposed that the group develop a submission for funds from the Queensland Government ICT Innovators Grant to support professional learning about digital portfolios. A submission similar to the one in sections b-h was prepared by T. Otto and forwarded, but was unsuccessful.

   ii. In November 2003, N. Thorpe, Principal Education Officer (Performance Measurement) Toowoomba Education District, suggested the submission in sections b-h be forwarded to the TTMSCE for inclusion in their budget. $A2000 was received for activities in 2004.

b. Aim

   i. A grant is sought to develop student digital portfolios in the Toowoomba and The Downs Education Districts through learning networks for teachers and principals.

c. Project Synopsis

   i. There is awareness within the districts of a need for more authentic approaches to assessment and for a wider range of information sources. Assessment and reporting should align with student activity in the new curriculum framework, reflect higher order thinking, and recognise the rich diversity of students' talents and abilities. This proposal to develop a network to share learning about student digital portfolios is an opportunity to meet these needs, as well as to utilize and build on existing ICT resources and skills.

   ii. Teachers have traditionally relied on print-based methods to collect and organize the documentation and artefacts that present a student's growth and achievement over time. However, the advantages of a student digital portfolio include the ability to link multiple objects and coordinate the presentation of student achievement with document, video, graphic, and sound files, as well as to update, store, and distribute files.

   iii. The part that students play in constructing a record of their achievements will lead to improved engagement and interest, to opportunities for students to be more reflective in their learning, and to a focus on a student centred approach to teaching.

   iv. Taking the concept of portfolios through to an institutionalised practice is a complex and time-consuming task. The strength of a network approach lies in the efficiencies to be gained from the co-ordinated development of conceptual frameworks utilizing shared ideas, resources, and skills. There is also an opportunity for schools to trial different elements of frameworks, which are then collated and shared.

d. Links to Education Queensland Initiatives

   i. The project will assist schools to address the following Key Action Areas of the Middle Phase of Schooling : Focus and accountability by providing rich, in-depth assessment information; Curriculum, teaching and assessment by promoting higher level of engagement and deeper understanding; and Transition by improving continuity of information exchange and pedagogy years seven to eight.

   ii. The project supports the goals of the new outcomes based curriculum, as well as assessment and reporting initiatives by recording and collating data for reporting purposes.

   iii. The project utilizes and builds on existing resources and teacher and student skills developed through the ICT for Learning Agreement. Specifically, the project relates to the capabilities of teachers to effectively engage with and use ICTs as a tool for learning; access to modern ICTs; and commitment to improvement through innovation.

e. Activities

   i. Conceptual frameworks on which to base student digital portfolios will be designed, developed, implemented, and institutionalised. Ideas already generated include digitally videoing children reading before and during Reading Recovery and then tracking the children on return to class; digitally photographing work samples linked to identified outcomes; videoing children reading and scanning their running record for richer information; use of multimedia for children to develop self-assessment portfolios; recording assessment of children with special needs; and sharing portfolios from years seven to eight.

   ii. Existing networks and partnerships will be enhanced and new ones established as ideas, experiences, resources, and expertise are shared. The University of Southern Queensland (USQ) has expressed interest in exposing their preservice teachers to the format and function of student digital portfolios in a school setting and accessing samples of student work (that are flagged as appropriate). USQ would contribute mentoring and expertise. The Toowoomba Technology Maths Science Development Centre has expressed support in the way of production expertise (e.g., digital video capture, editing, rendering, and CD-ROM production). The Literacy Development Centre will be a source of ideas. The Learning Place and QSITE are sources for communication (e.g., Blackboard) and dissemination.

iii. School administrators, teachers, and aides will engage in staff development activities. Similar projects in Australia and overseas will be investigated. The ICT skills of teachers, aides, administrators, and students will improve through an authentic application of the latest ICTs. Effective and innovative use will be made of existing ICT infrastructure and expertise. Teachers, students, and administrators will access the latest technology, develop new skills, become aware of contemporary practices, and participate in an authentic application of ICTs. Staff will collectively reflect on practices within and outside their schools and share the outcomes with others. Opportunities will be generated to engage parents and students in induction activities.
iv. Outcomes will be disseminated to other schools in Queensland and beyond. An objective of a PhD research project (principal researcher Dr T. Otto) is to develop a technology enhanced constructivist learning environment as a platform to disseminate outcomes and report on the effectiveness of the DPN.

f. School Resources
   i. Teachers and principals are enthused about the concept because they can see the benefits for children. They welcome an opportunity to share and develop their expertise, and can visualise the project as "workable."
   ii. Schools are committed to supporting the project through their staff development, ICTs for Learning Agreement, and equipment replacement budgets. The existing extensive networks of computers would be utilized, and teachers are committed to attending meetings, sharing ideas and developing concepts, communicating with partners, investigating projects in other schools and in the literature, learning to use hardware and software, and passing on what they have learned to others.

g. Feasibility and Sustainability
   i. There are teachers and administrators within the network who have high levels of ICT skills as well as the motivation and experience to implement and maintain innovative practices. The network approach to the project will contribute to its sustainability because the frameworks developed will reflect the ideas of teachers from several schools. Individual schools may trial one element of a framework and not be overwhelmed by the enormity and complexity of the task. The larger schools may provide outreach services for smaller schools. As well, school communities will become aware of the benefits of digital portfolios beyond that implemented in their own school. The self-efficacy of teachers and students will be enhanced as they develop skills and become comfortable with the concept and processes.

h. Funding Sought
   i. $A2000: TRS [Teacher Relief Scheme to replace teachers on leave and those participating in professional development at a cost of approximately $A300 for each day], travel and other expenses to release administrators and teachers to observe portfolios in other schools; for educators from other schools to visit our district; and to release administrators and teachers to develop frameworks. (Outcome: Approved)
   ii. $A5000: Purchase of software and hardware for use across the districts. (Outcome: Not approved)

4. Inaugural Meeting of the Digital Portfolios Network (DPN) (May, 2004)

a. Details
   i. Wednesday, May 12, 2004, Withcott State School Library, 4.00 to 5.00 p.m.
   ii. Attended by 30 teachers and school administrators in the Toowoomba and The Downs Education Districts.

b. Agenda
   i. T. Otto presented an overview of the purpose of the meeting.
   ii. The unsuccessful submission to the ICT Innovators Grant and successful submission to TTMSCE for $A2000 was outlined.
   iii. D. Hacker (teacher) and G. St Clair (principal) from Gatton State Primary School and T. Otto (principal) from Withcott State Primary School presented examples of student digital portfolios frameworks they were developing.
   iv. Participants discussed how the network would operate, e.g., time for sharing, technical advice, real life experience, practical applications, skill building, and The Learning Place project room.
   v. Workshops were to be held once a term and a planning committee was formed.

5. Planning Committee Meeting of the Digital Portfolios Network (DPN) (June, 2004)

a. Details

i. Wednesday, June 3, 2004, TTMSCE, Wilsonton Campus of Toowoomba State High School.

ii. Participants:

T. Otto (Principal, Withcott State Primary School)
S. Fuller (Principal, Pilton State Primary School)
G. St Clair (Principal, Gatton State Primary School)
C. Zilm (Principal, Toowoomba State High School)
N. Thorpe (Principal Education Officer, Performance Measurement, Toowoomba)
M. Smith (Principal Education Officer, Performance Measurement, The Downs)
B. Dittman (Co-ordinator, TTMSCE)

iii. This meeting established patterns of activity and the involvement of participants that continued throughout the reporting phase of the project.

b. Agenda

i. The funding of $A2000 was to be held at Withcott State School to support network activities.

ii. The TTMSCE was to be acknowledged in communications.

iii. N. Thorpe to contact the district Learning Place Co-ordinator to establish links to the project room. T. Otto to upload links to professional papers and other information as a starting point for interested participants to access resources (see appendix E.1).

iv. An after-school workshop was to be organised at the TTMSCE on Wednesday 21 July 4.00 to 6.00 p.m. N. Thorpe to contact A. Fenney from Pozieres State Primary School to run a one hour session including examples of his portfolios based on FrontPage and the conceptual framework behind his thinking. TRS and travel for A. Fenney and afternoon tea was to be paid from the funding (Outcome: A. Fenney did not require funding). B. Dittman to organise a skill development session for the second hour so that participants may begin to create portfolios.

v. A whole-day workshop was to be organised at the TTMSCE on the student free day on Monday, October18, 9.00 a.m. to 3.00 p.m. N. Thorpe to contact Woodcrest College in Brisbane for a teacher to present a one hour session including examples of their work and the conceptual framework behind that work. TRS and travel for the teacher and meals were to be paid from the funding. (Outcome: The Woodcrest College teachers did not require funding) B. Dittman to organise sessions for the rest of the day so that participants develop skills at their own level including PowerPoint, Producer, and FrontPage, using a scanner, digital camera, and video and audio editing. At the end of the day participants should be able to take away an example of a portfolio on CD they develop themselves that suits their needs. Other expertise in the district may be utilised, e.g., G. St Clair and D. Hacker at Gatton State School.

vi. Contact to be made with the Action Research projects at Ipswich and Hervey Bay and David Potter about the tool he is developing (Outcome: Not enacted).

vii. N. Thorpe to arrange an email discussion list. (Outcome: Enacted, see section 5).

viii. Feasibility to be investigated of sending someone or group to Tasmania to report on developments. (Outcome: T. Otto went to the ePortfolio Australia Conference in December, 2004, see section 10)

ix. S. Fuller to talk at The Downs Education District Teaching Principals Meeting, and T. Otto to talk at the Toowoomba Education District Principals Meeting to promote the Network.

x. T. Otto to inform P. Albion and P. Redmond from the University of Southern Queensland.

xi. T. Otto to prepare a proposal for a group submission of a paper for the SITE 2005 Conference, Phoenix, Arizona, March 1-5, with the abstract due October, 15, 2004. (Outcome: See section 10)

xii. N. Thorpe & T. Otto to prepare a submission to the National Awards for Quality Schooling and ICT Innovators Grants (Outcome: Investigated but not enacted as the project was not sufficiently advanced at the time to meet the criteria for submission).

xiii. T. Otto to put together a “flyer” outlining activities proposed for the Network in 2004 and the Workshops in Terms 3 & 4. N. Thorpe to distribute via email across the education districts.

xiv. Next Meeting to be held at 8.30 a.m. on Friday 3 September, 2004, on The Learning Place chat room to finalize the October Workshop (see section 8).

6. Email Discussion List

a. Details

i. Education Queensland employees are able to establish an email discussion list. Other employees interested in the topic may subscribe to the list.

ii. Notification of the discussion list was added to all information distributed by the Network.

7. Stimulating Reflections about Digital Portfolios

a. Details
   i. T. Otto proposed the following questions to stimulate thinking and discussion about digital portfolios.
   ii. In June, 2004, the list was posted on The Learning Place project room and forwarded to teachers and school administrators through the email discussion list.
   iii. In June, 2005, the list formed the basis for a survey designed to collect data about the progress of implementing ePortfolio frameworks in schools that received funding.

b. Questions to Stimulate Thinking and Discussion
   i. What is your context?
   ii. What purposes would ePortfolios serve in your classroom or school?
   iii. Who is the audience and what ICTs do they have to view ePortfolios?
   iv. What elements need to be included in the design of your ePortfolios?
   v. What software would be used to organise and view the student's work (e.g., FrontPage, PowerPoint)?
   vi. What software would be used for publishing and editing (e.g., Word, Publisher, video editing)?
   vii. What ICTs do you have and what needs to be purchased?
   viii. What skills do you and your students have in using ICTs?
   ix. How will data be stored?
   x. How will time be managed (e.g., scanning and editing artefacts, reviewing ePortfolios, talking with students)?
   xi. How will the ePortfolios be viewed and by whom? What privacy and security issues need to be addressed?
   xii. What other management issues need to be considered?
   xiii. Will your ePortfolios be teacher centred or student centred?
   xiv. How will you monitor the curriculum to ensure core outcomes and literacy and numeracy skills are still being covered?
   xv. What changes will occur in teaching practices when ePortfolios are implemented?
   xvi. What changes will occur in conversations between teachers and students, teachers and parents, and students and parents?
   xvii. How will ePortfolios change the use of ICTs in your classroom or school?
   xviii. What books, articles or web sites about ePortfolios have influenced your thinking? Why?
   xix. What aspects of ePortfolios in other schools appeal/not appeal to you?
   xx. What documents have you written to address issues or inform people about ePortfolios (e.g., school policy, staff notes, and newsletters)? What documents support your program (e.g., lesson plans and curriculum frameworks)?
   xxi. What conversations have you had with teachers, parents, and students about ePortfolios?

8. After-School Workshop (July, 2004)

a. Details
   i. Wednesday, July 21, 2004, TTMSCE, Wilsonton Campus of Toowoomba State High School.
   ii. Evaluation surveys were not prepared for this session, but were designed and distributed at all future Workshops.

b. Sessions
   i. 3.45 p.m.: Afternoon tea (free)
   ii. 4.00 p.m.: A. Fenney presented his work on portfolios at Pozieres State Primary School.
   iii. 5.00 to 6.00 p.m.: Hands-on workshop using FrontPage to develop portfolios. B. Dittman, Co-ordinator of the TTMSCE designed a template for distribution to interested participants.

c. Digital Portfolio Template
   i. Changing the pictures (images): All images are saved in the images folder. By adding your own images with the same file names the template is then yours to use.
   ii. School Badge: The image badge.jpg is 400 pixels wide by 100 pixels high. Create your own image in paint.
   iii. Names and properties of student photos: Try to keep the images to no more than 300 wide.
   iv. Adding Video: Save your video files to the video folder, but keep them small, e.g., 320 wide. Use the Video 1 page as a template. Save the page as a new file and then make your changes. Select the HTML tab and then use the "Edit, Replace" command to change the file path to the new file. Choose "replace all." Remember to include the video/folder as part of the file name.

9. Planning Committee Meeting of the Digital Portfolios Network (DPN) (Sept, 2004)

a. Details
   i. Friday, September 3, 2004, The Learning Place online chat room.
   ii. Participants:
      T. Otto (Principal, Withcott State Primary School)
      S. Fuller (Principal, Pilton State Primary School)
      G. St Clair (Principal, Gatton State Primary School)
      C. Zilm (Principal, Toowoomba State High School)
      N. Thorpe (Principal Education Officer, Performance Measurement, Toowoomba)
      M. Smith (Principal Education Officer, Performance Measurement, The Downs)
      B. Dittman (Co-ordinator, TTMSCE)
   iii. Internet connections in some of the schools were slow, making responses difficult to co-ordinate. Details of an upcoming staff development day are organised in the following excerpt of the latter part of the meeting.

b. Excerpt of the Chat Room Meeting
   i. S. Fuller: Sorry, just had to race over to the year 2/3 room to grab a recalcitrant student. I'm off now. See you soon.
   ii. N. Thorpe: Hi, Tom and Stuart. Everyone else has left the chat room. Hope you enjoyed the meeting. Sorry about the slow machines. See you later! Barry, Tom and I will get going on the jobs. I think we can close down the chat now. Will see you all on October 18 and will set a date in Term 4 for our next meeting to organise 2005.
   iii. B. Dittman: I will send you both a copy of the suggested format and I will contact Coretech and Downs [company names] about a tradeshow.
   iv. G. St Clair: Can we load a PowerPoint template onto the computers?
   v. M. Smith: I guess that looks like 10 mins each! Who's doing the flyer? Should we provide some TRS for preparation time?
   vi. G. St Clair: Barry, I think that Dave would be happy to do the PowerPoint session at 1.15.
   vii. N. Thorpe: Folks, I think we have done this job pretty well. Can the details now be left up to a smaller organising group? I suggest Barry, Tom and myself to complete arrangements. Is this OK?
   viii. M. Smith: Can you talk to Highfields and Fairview, Barry. I'll talk to Brett. How long will they each have? I think $A20 is fine for catering.
   ix. B. Dittman: I think if we all come knowing this is a sharing time and the schools presenting are a few steps ahead then we would have plenty of people who could present! So a program could be [as listed in section 9b].
   x. S. Fuller: Clifton is a smallish school and has apparently made a start. Don't know of any Band 5's [one or two teacher schools] in our area doing DPs.
   xi. N. Thorpe: We have a plethora of people who could be contacted!! Can we go with Gatton, Crow's Nest, Highfields and Fairview Heights as people who will 'chat' about their experiences? Could we ask for a contribution of $A20 (mainly to cover catering costs) from attendees? I am assuming that all 'hands-on' sessions will be for everyone together regardless of level of expertise.
   xii. M. Smith: Good idea. She's doing good things. [B. Butler, teacher at Crow's Nest State School] talked for an hour and half to the teaching principals!!
   xiii. B. Dittman: Maybe [teacher] at Fairview could talk about the work she is doing with the prep class?
   xiv. G. St Clair: [D. Hacker, teacher at Gatton] would probably be more comfortable with a round table chat where anyone can offer what they doing.
   xv. N. Thorpe: Costs? Do we want participants to contribute a little towards this? Do we, as Marg suggests, get retailers to display equipment? Do we advertise this event more broadly than just our email circulation list and The Learning Place site?
   xvi. M. Smith: I wouldn't think there is a small school ready, would you Stuart? I think Brett's high school perspective would be of interest.
   xvii. G. St Clair: My only concern there is that many people have seen what we are doing and there have been no dramatic changes since that first network meeting.
   xviii. B. Dittman: Stuart, one of the movie maker sessions could contain a demo on capturing footage. It is slow though so we would have to let participants see it but then work on pre-captured footage. We can provide staff to do movie maker, producer, network setup, FrontPage - but others could take one of these! I think we should leave the meal breaks as breaks but there is nothing to stop us suggesting it as a good time to hear more from nominated schools i.e., use the time before morning tea to highlight a couple of stories e.g., Geoff, Highfields yr 4 etc. and then people can hunt the reps down and talk with them.

xix. T. Otto: Most have fair technology skills and only a few are beginners. Perhaps a special session for them. Most are general items such as FrontPage and editing and could be grouped fairly easily.
xx. S. Fuller: Would like to look at transferring video from camera to pc.
xxi. M. Smith: Should we have a retailer display? Don't know about numbers but from what I hear there is a lot of interest.

c. Outcome
  i. Participants were never required to pay for the Workshops. Funds were available to cover costs, which included afternoon tea and a relief teacher for the presenter. T. Otto believed that free sessions would be more attractive to teachers, and that they could attend without having to ask their principal for funding.
  ii. An example of teachers nominating without having to ask for financial support was provided in the following email received prior to the Workshop on May 25, 2005. "Hello Tom, I am hoping you can fit me [a teacher] and [another teacher] in at the next ePortfolio day on the 25th May. We have seen [our principal] to RSVP for us but being the busy principal of [school] that he is I thought I would take matters into my own hands. Looking forward to learning lots on the 25th.
  iii. A retailer display was arranged for the October session because it was a whole day activity and participants would have time to view exhibits.

10. Whole Day Workshop (October, 2004)

a. Details
  i. Monday, October 18, 2004, TTMSCE, Wilsonton Campus, Toowoomba State High School.

b. Sessions
  i. 9.00 Welcome by Dr T. Otto (principal, Withcott State Primary School)
  ii. 9.15 Woodcrest College - Presentation by two teachers (see appendix F.2 for transcript)
  iii. 10.00 Sharing Local Stories - Presentation by D. Hacker from Gatton State School (see appendix F.4 for transcript) and by B. Dittman (section c below for transcript)
  iv. 11.00 Morning Tea
  v. 12.00 Elective Sessions: *FrontPage*, *Movie Maker*, Setting up networks
  vi. 1.00 Lunch
  vii. 2.00 Elective Sessions: *Movie Maker*, *Microsoft Prod*ucer, *PowerPoint* Portfolios
  viii. 3.00 Discussion: What are we trying in our schools? What resources should the cluster provide?
  ix. 3.15 Evaluation: Comments and Likert scales (1-least useful to 5-most useful) on each session.

c. Story Shared by B. Dittman
  i. I want to pick up on Sue's story from [a local primary school]. She's the teacher in charge of the Prep trial at [the school] this year. If she was here, she would tell you at the start of the year she didn't even know how to open PowerPoint and use it. At the end of last term, every student in the prep class took home a video on CD-ROM from the work that they were doing so she's had an incredible journey in the last nine months. I guess the reason I wanted to pick up on this is because the prep trial forced on Sue a few things like they require a lot of data about what the kids are doing so with young kids, difficult as we know, they can't write a lot of stuff although it's amazing how far those kids have come in nine months in prep as well. So we started looking at digital photos, taking lots of photos and in fact the kids, the prep kids are taking photographs as well. These are five year olds with digital cameras, and snapping away. No problem whatsoever. Maybe one in twenty photos are worthwhile using but . . . and so the question there was, what could she do with it, how could she present it?
  ii. So I sort of had a bit of a vested interest in this, my daughter was in the prep trial but at the same time Sue came to me as part of the Centre of Excellence, can we work together to work out some ideas. In the last nine months she's learnt how to use Movie Maker, she's learnt how to use PowerPoint, and she's put those things together. Also, she's established a partnership with our school here, and so the prep children actually came here twice.
  iii. Now someone asked a question about access to computers before. Most high schools have both access to labs and hub. A number of primary schools have labs. I think the message coming out from spotlight on science and all the different things is we don't do things in isolation, there's not the money for all of us to have ten, fifteen labs in our schools but the reality is, as the lady said earlier, there's down time everywhere in these machines. They're such a big investment that we need to access them. So what happened there is students at our campus had to create a video CD-ROM as part of their assessment piece so through the partnership with the prep trial kids, they were coming around here, our kids taught the five year olds how to use Movie Maker. The kids then created and recorded their own voices, the parents got a record of all of this. They thought it was wonderful but at the same time Sue got

a real snapshot of where the kids were at with their speaking, with their interpretation of image.

iv. What was happening was as the photographs were popping up on the screen, the prep kids were telling us what they were doing in those photographs so there was this reflection process going on, a literacy exercise, a visual exercise. I do know others have grabbed a copy of it and it's starting to do the rounds as well, it's just an idea that is possible.

v. I guess the two points I want to bring out of that is the fact that Digital Portfolios and digital collections of things that are going on in the classroom can be done in lots of different ways and I think the biggest thing that we got out of the last talk (D. Hacker from Gatton State School) is not to be afraid of it, just to have a go.

vi. The kids, they are the ones growing up with it, it's nothing new to them, they're growing up with it and they will use the technology. And so the second message is be a learner with the kids. We've started projects here this year at our school with the kids where our teachers didn't know flash. We provided training for them to do projects with the students on the condition that they also trained the students at the same time. Now some people might find that threatening but in fact, all the people working on this project found that they were learning at the same time. The students could see that and that at the same time the students could see that the teachers had a different set of skills that were really important and so the teachers and students could talk about the project and the teachers would help them with organisation and structure and all the things that we do really well. So be a learner with the kids.

vii. The third thing is, learn to look outside of your own four walls because there are resources everywhere and you don't have to have the biggest or the best, and you don't even have to have thirty of them, you can start with just one computer. But linking schools together, linking with industry, making partnerships with parents and friends, all of these things help us to expand the opportunities that our kids get.

viii. The beautiful thing out of this in the prep trial around there is that the parent group have now raised $A3000 for that particular preschool unit and that preschool is now going to be networked. It's going to have new computers because the parent group got all this stuff back from them as well. So there's another benefit to the school, the parents can see reasons for investing in that school. Even though all our kids will be gone, it will be the next two, three generations that get benefit out of that

ix. I guess that's a story I wanted to share with you. Unfortunately I don't have anything to show you from Sue. We weren't able to get it but that's just another story that we can share.

d. Comments by Participants: Woodcrest College Presentation

i. Very informative. Great to see samples of portfolios.
ii. Advantages well highlighted. Increase in social/emotional areas is wonderful. Community building.
iii. Very useful to actually see some completed portfolios, to get a better understanding.
iv. Laboured the point a little. Gatton was good work.
v. Good to see what schools are doing.
vi. Great to see examples and hear of others taking years to develop - not an overnight project.
vii. Great to see the potential of digital portfolios.
viii. Fabulous, very interesting and motivating!
ix. Very interesting and informative. Gives me ideas for next year.
x. Great to see someone's experience and how its changed relationships.
xi. Great to see where it all can go, especially improving teacher, student and parent relationships. Teachers presented this well.
xii. Have seen most of this previously but relevant to other topics today.
xiii. Good to see how a school implements digital portfolios.
xiv. Gave information. Relevant ideas.
xv. Good to see different things to add to portfolios e.g., reflections and how to use as an assessment tool.

e. Comments by Participants: *FrontPage* Session

i. The pace was great. Perhaps more time needed to do more hands-on.
ii. Great for use with hyperlinking a student's portfolios.
iii. Good presentation for the not so good learners.
iv. Presenter went too fast for my basic standard.
v. Interesting. Bit too fast.
vi. I need to go more slowly through the steps but I still gained quite a bit of valuable know how.
vii. Very interesting, very useful but a bit rushed.
viii. Little background knowledge. Had some difficulty keeping up.
ix. I now understand hyperlinks.
x. Not so familiar with this but can see how it works basically.

xi. Well presented.
xii. Handout was good. Still need to learn more.
xiii. Good but prior skills would have been an advantage.
xiv. Still not comfortable with this program. Needed to go back a little further.
xv. I learnt heaps.
xvi. Good starting point to organise portfolios.
xvii. An alternative for using PowerPoint. Perhaps not as easy for younger children and older teachers!

f. Comments by Participants: *Movie Maker* Session
  i. The process was too quick for me. I really enjoyed all that I was able to absorb.
  ii. Too fast paced. Explanations not clearly presented. Confusing.
  iii. Very fast. Very fiddly, choppy presentation.
  iv. Need more time to experience more elements to master. Little confusing. Need more cheat sheets.
  v. Fantastic program but could have been presented much better! It was very easy to get lost.
  vi. Information was presented too quickly.
  vii. Information overload, but I want to find out more.
  viii. I wish our school was XP.
  ix. Fabulous applications.
  x. Excellent. However too much in too short a time.
  xi. Brilliant.
  xii. Helpful.
  xiii. Great but my computer screen died.
  xiv. If we had the program it would be better.
  xv. Good. A bit slow.
  xvi. Great workshop. Need more time to use program with guidance.
  xvii. Excellent. Never seen this before but feel skilled enough now to make movies with students and guide students to be independent.
  xviii. Presenter explained to every level.

g. Comments by Participants: *PowerPoint* Portfolios
  i. Great. Some very useful tips.
  ii. Well presented. Clear and well paced.
  iii. Very useful. Well presented.
  iv. Great presenter. Very helpful. Great variety of task shown.
  v. Interesting presentation.
  vi. Really good and practical.
  vii. Very practical, useful, clear and relevant.
  viii. Explained programs and shared usefulness.
  ix. Easy can see how our students can use it. Good starting point.
  x. Easy exercise. Made it more understandable.
  xi. Knew a little and now know quite a bit more - learnt from someone who took things at an easy pace and progressed logically from start to finish.
  xii. Great! I learnt a lot. I think this might be a good way to do this.
  xiii. Great. I have learnt something I will use.
  xiv. Good, came away with new knowledge and skills but presentation was very fast for a beginner like me.
  xv. I know how to hyperlink now!! Can see how this saves on scanning etc. Great alternative to using FrontPage. Will work best in Yr 1-7 class.
  xvi. Good to have time to explore.
  xvii. It was good to go from nothing to producing a simple portfolio with all the links including bringing a *Word* document across.
  xviii. Refresher course, good to have the opportunity today instead of trying to find time.

h. Comments by Participants: Microsoft Producer
  i. Notes from the *PowerPoint* presentations would be a great idea.
  ii. Thanks, will work with others at school and Moviemaker 2.
  iii. Could be more practical. Instructor talked for most of session. Great software.
  iv. Well presented.
  v. Content excellent. A bit rushed though.
  vi. Presented a bit too fast.
  vii. Not enough time to become familiar. Great potential will need to investigate more. Any chance of doing longer workshop on weekend or holidays?
  viii. Difficult when participants' knowledge is limited. Want to experiment more - great info.
  ix. I need to go more slowly through the steps but I still gained quite a bit of valuable know how.

x. The best technology software I have seen. Fantastic for any age.
xi. Concept well explained in time available

i. Comments by Participants: Other Comments by Participants
   i. Good. I now need a sample proforma model.
   ii. A great day. Very useful.
   iii. Training sessions need to be longer and at a slower pace. Need time to take it all in.
   iv. Full of good intentions to set these up with the children.
   v. Very practical.
   vi. Be aware of the age group and standard of computer skills of the group. Many people got lost.
   vii. I enjoyed the sessions. Would like to have more time on it.
   viii. All have different skill and competency levels. Sessions could be based around these.
   ix. Lots of primary teachers seem to be involved, few secondary teachers are… more liaising needed so what is put on portfolios from Year 6-7 is useful at the next level.
   x. A really good day.
   xi. I would like to start doing something with it next year.
   xii. Overall a very worthwhile experience providing inspiration and skills to get started.
   xiii. As a student teacher preparing to teach, these sessions provided a good window into what can be used in the future. Excellent resource.
   xiv. Attended meeting earlier in year. Never got started. Good to have momentum back. Think I will develop template this year and begin with students next year week 1.
   xv. Enjoyable day. Very informative.
   xvi. Term 4, 2004, beginning to use portfolios as preparation for 2005.
   xvii. Great way to organise student work. They can select from their folders what they want to show.
   xviii. Great workshops but would prefer more time on only one topic. I feel enthusiastic about organising our folders more professionally & using portfolios in parent interviews.
   xix. Excellent to be able to use computers as we worked through the software.
   xx. A great day, however time constraints made it difficult to get a full grasp on the technical side of actually making/using these types of software.
   xxi. As a preservice teacher it has opened my eyes to new possibilities that will engage students, especially boys.

j. Ratings

Table D.2: Workshop Evaluation Summary (October, 2004)

Sessions	Usefulness					Total	Mean
	1	2	3	4	5		
Woodcrest College		1	6	21	15	43	4.16
Front Page			6	8	7	21	4.05
Movie Maker		3	5	13	8	29	3.90
Setting up networks			2	3	1	6	3.83
Microsoft Producer		3	4	8	4	17	3.88
PowerPoint			1	6	13	20	4.60

k. Planned use of Digital Portfolios
   i. Are you using digital portfolios? Yes 6 No 36
   ii. Do you plan to use digital portfolios? Yes 42 No 0

11. Conferences

a. SITE, March, 2005, Phoenix Arizona
   i. In November, 2004, members of the planning committee of the Digital Portfolio Network responded to the “Questions to Stimulate Reflections about Digital Portfolios” (see section 6 for the questions and section 11-14 for responses) as their contribution to a proposal for the 2005 SITE Conference in Phoenix, Arizona.
   ii. T. Otto prepared the proposal, which was accepted with these comments: “Well done! Well thought out team approach to an application of IT to problem and community of learners. Great and original work. I look forward to your presentation.”
   iii. T. Otto was to present the paper but was unable to get permission from the State Minister for Education to attend.

b. ePortfolio December, 2004, Australia
   i. T. Otto attended and gave a presentation on the activities of the Network titled *A Story of Professional Learning*. Several conference participants indicated their interest in the project.

ii. T. Otto met Dr Elizabeth Hartnell-Young and Dr Helen Barrett, whose work contributed to the information resources distributed within the network (see appendix E). A summary of main points from the conference was presented at the next planning committee meeting.

12. Reflections on Digital Portfolios from a Primary School Principal

a. Details
   i. In October, 2004, questions were emailed to G. St Clair, principal of Gatton State Primary School, who returned the responses below by email. D. Hacker, a teacher at Gatton, had implemented digital portfolios with his class throughout the year.

b. Context
   i. Gatton State School is located 100 km west of Brisbane in a provincial town of 8000 people. The school has an enrolment of approximately 660 students from preschool to year seven.

c. Purposes
   i. For my school, the main purpose is to increase the ICT skills of students and teachers. Other related purposes include allowing students to experience success and thus increasing self-concept; providing students with a focus for independent activity & learning; and encouraging student self-evaluation.

d. Software
   i. *PowerPoint* in *kiosk* view.
   ii. We are thinking of buying *Pinnacle* for video editing but are investigating its use. We currently use *PowerPoint* for all aspects of digital portfolios. Some student project documents linked to *PowerPoint* are published with *Word* & *Publisher*.

e. Hardware
   i. Every class developing digital portfolios has access to: 2-3 computers in the classroom; a lab for class lessons when needed; all computers purchased now include CD burners; digital still cameras which will also record video with sound; scanner in each classroom; digital video camera.

f. Data Storage
   i. This has not been a problem for us so far. It may become a problem over time. When the time comes, we will consider additional hard drives as these are now very cheap and also DVD burners.

g. Time Management
   i. We have released a teacher for several sessions each week using curriculum co-ordination time. This teacher is able to provide the impetus and support for the program.

h. Curriculum Monitoring
   i. The way we use digital portfolios, they are part of the day-to-day program of students. Each portfolio must contain mandated elements set by the classroom teacher plus a variety of optional elements selected by the individual student. It is up to the teacher as to how much they integrate the digital portfolio into the different subject areas.

i. Changes in Teaching Practices
   i. They are student centred. However the teacher does have some control over content.
   ii. At some stage we will use them for partial reporting to parents on student progress. This will provide parents with powerful examples of student's work and progress made over time.
   iii. Students have learnt how to use a range of hardware types and have become extremely competent with MS PowerPoint. The ability to use PowerPoint competently will also translate over to MS Word, FrontPage & Publisher.

j. Literature
   i. Read a variety of articles from the Internet when we first began.

k. Examples of Digital Portfolios in Other Schools
   i. Only those which I have seen on the Internet plus A. Fenney's.

l. Documents
   i. I designed a mock digital portfolio using PowerPoint to demonstrate to teachers their potential.
   ii. Prior to students using the computers, they were given a booklet where they could put down on paper some of the content which they would include in their digital portfolios. This also reduced the initial rush to use a limited number of computers.
   iii. We also provided students with an initial PowerPoint template to begin their portfolios.

m. Conversations
   i. We have spoken at whole staff meetings about their use.
   ii. We have shown our parents at P&C Meetings some of the students' digital portfolios.

13. Reflections on Digital Portfolios from a High School Principal

a. Details
   i. In October, 2004, questions were emailed to C. Zilm, principal of Toowoomba State High School, who returned the responses below by email.

b. Context
   i. Toowoomba State High School exists on two interdependent campuses: one is eight to ten and the other is eight to twelve. There has been a time since the foundation of the second campus in 1998 involving the definition of this relationship between the campuses and the future development of the school.
   ii. Both campuses have been implementing the 1-10 KLA based syllabuses and defining the reporting processes in terms of information provision to parents. While the syllabuses have been 'rolled out' in stages, there have been a number of variations arise that are now leading to conversations about the nomenclature around reporting student achievement.
   iii. An IDEAS school renewal school, working with USQ to identify and build on the School's strengths has involved the development of a new school vision: two school contexts defining their own preferred futures.
   iv. As part of the development of a school-wide pedagogy, staff are investigating the development of a fascinating curriculum and communicating student achievement to parents in a meaningful manner.
   v. The principal has defined a position based on consensus from Heads of Departments that the 1-10 syllabuses are the tools for planning the curriculum and that assessment should be based on the performance of the child on meaningful tasks that culminate learning episodes. While the structure of the reporting system is being developed, there is naturally significant discussion about the possibilities of conferencing and student demonstration as a meaningful reporting tool.
   vi. Toowoomba State High School has more than 22 feeder schools. Students arrive at TSHS from any of the plethora of Primary Schools in Toowoomba and beyond. Significant numbers, however, come from the cluster schools with which TSHS has established firm relationships over the past 18 months. Staff in these schools are engaging in discussion and work on curriculum, teaching and resourcing. Principals in these schools are addressing the need to develop a common reporting language in terms of the information carried to High School as well as common elements from Primary to High School that facilitate effective tracking of pupil development as they make the transition to secondary schooling.

c. Purposes for Digital Portfolios
   i. Digital portfolios will act as a point of collection for students to manage their own learning exhibitions. By selectively updating the achievement, developing skills will be showcased.
   ii. They will become tools that facilitate significant conversation between the school and home. Currently, students do not take their work home for parents to view and discuss.
   iii. Digital portfolios should provide significant developmental support for learning.

d. Design of Digital Portfolios
   i. Content needs to be governed by a set of expected performances. Additional showcasing can be included to supplement discussion and celebrate performance strengths.
   ii. It needs to be selectively updated and annotated by teachers, commented on by pupils, peers and carers/parents.

e. Software Preference
   i. I think that FrontPage is the best medium as I would prefer that these portfolios be web-based. As students develop their web making skills, they may use any authoring package to individualise the presentation. What needs to remain at the core is the defined minimum expectation for content.

f. Hardware Needed
   i. Ultimately, students need satisfactory time to access computers at school or the facility to upload information from home.
   ii. In the School, we need to have video cameras for performances and scanners and cameras to capture images.

g. Data Storage
   i. We currently purge the curriculum network annually. We would need to maintain the network files on portfolios and ensure that pupils minimise their files as much as possible. The selective updating nature of the folios will ensure that they do not become enormous volumes.

h. Time Management
   i. Still to be addressed. Curriculum time is available for students to access the computer systems and lunch times are also made available.
   ii. Analysis of the usage of the computer rooms shows that greater awareness and efficacy of teachers needs to be a focus for future development.

i. Other Issues
    i. Information security, copyright, privacy and census mechanisms are to be addressed.
j. Curriculum Monitoring
    i. This question underpins what I think are major issues in schools currently. We are trying to achieve everything when the syllabuses themselves are notional and their implementation is defined by each school site within a framework of transportable curriculum. Why then, do we become slaves to the core outcomes in terms of reporting? We can define authentic learning outcomes based on the outcomes and define a series of performances that can demonstrate the development of the child. The school will need to define a series of literacy performances that transfer and find relevance beyond age. These performances should be from a range of multiliteracies. What we do not have in High Schools is a defined level of performance expected in fundamental skills of literacy. Because of this, the school and community shall define the range of anticipated performance.
    ii. Curriculum defined by the 1-10 statements will carry with it some expected output.
k. Changes in Teaching Practices
    i. Teachers will focus on student performances.
    ii. Students will be called upon to take responsibility for collating their achievement collation. Teachers will be part of the process for achieving the product. The portfolio is not the teaching tool.
    iii. These conversations will be performance based and be able to be centred on the development of the student using a current evidence base.
l. Use of ICTs
    i. I can only imagine that teachers will need to develop far greater proficiency in ICTs themselves.
m. Literature
    i. Web-based research samples of digital portfolios. I am not convinced that there is a significant pedagogical advantage to using digital portfolios as a tool for learning. Rather, I am certain that they are significantly important to develop performances through conferencing between student and teacher, teacher and parent and student and parent.
n. Examples of Digital Portfolios in other Schools
    i. I do not like that they become repositories for enormous amounts of data that is unlikely to be reviewed.
    ii. I like that students personalise the appearance of their presentation.
o. Documents
    i. I am focusing on developing a school-wide pedagogy in my two sites. We are also reviewing and defining a position on assessment and reporting. There has been relatively limited information being written about concerning digital portfolios. We need to arrive at the conclusion that Digital portfolios are the best format for profiling and developing learning plans for young people in our school.
p. Conversations
    i. We have started to look at a common language between faculties with assessment and reporting. Our Middle Phase cluster is looking at the transfer of meaningful learning information and performance.
    ii. As part of the digital portfolios network I have appointed a Head of Department (Innovation) to develop new solutions to our emerging issues.
q. Digital Portfolios Network
    i. Seeing people present their digital portfolios to people in Toowoomba who want to jump on the bus without the discussion of the bigger issues i.e., presenters who are experts and have not addressed critical issues in performance development. Have student learning outcomes improved because of the digital portfolios or because a conversation has just taken place?
    ii. I would like to spend time with leaders who are evaluating their philosophies with regard to achievement and assessment. We all need to put our: “We got it right at my place” hat away and be able to constructively criticise in a no blame environment rather than always re-packaging what we do.
    iii. I thought that it was interesting when I heard the presentation at Wilsonton from the teacher using digital portfolios. He said that he could not understand why primary schools kept hoarding information about student achievement and passed it on to high schools in an enormous wad that would never be read, yet his version of digital portfolios was simply an electronic version of this dilemma.
    iv. Round tables about assessment and reporting, conferencing, parent usage could be arranged.
    v. I would also like to have some exposure to the research base that links digital portfolios to improved learning outcomes.
    vi. Need online discussions with overseas experts.

14. Reflections on Digital Portfolios from The Downs Principal Education Officer

a. Details
   i. In October, 2004, questions were emailed to M. Smith, Principal Education Officer (Performance Measurement) The Downs Education District, who returned the responses below by email. As PEO, she works with 43 schools in a range of student and school performance areas.

b. Purposes for Digital Portfolios
   i. A record of student progress: video clips/photos/scanned images.
   ii. An assessment tool.
   iii. A teaching tool: students learning about technology by applying it.

c. Design of Digital Portfolios
   i. Simplicity: As primary students are introduced to the concepts, they need to start simple and build on their knowledge.
   ii. Purposeful: There needs to be a reason for the portfolio, which may range from a learning strategy to storing assessment pieces to a portfolio of work for parents to keep.
   iii. Ease of access: By those having an input and those viewing the product.

d. Software
   i. Front Page, Word, I don't know enough about video editing to comment.

e. Hardware
   i. A computer large enough for the files, preferably a server.

f. Data Storage
   i. Having a server helps.
   ii. Ensuring students/teachers review content periodically.
   iii. Saving data to CD and keeping only what is essential on a server.

g. Time Management
   i. Teaching students to have input to the portfolio.
   ii. Budget allocation for aides to assist with the process.

h. Other Issues
   i. Teaching teachers the processes when their time is already at a premium. Solution: Offer in and out of hours inservice; provide access to websites; encourage visits to schools where portfolios are operating successfully.
   ii. Hardware: Making people aware of the space that files can take and offering solutions e.g., JPEG files instead of Bitmap).

i. Curriculum Monitoring
   i. Connect some of the content directly to outcomes and provide appropriate comments on assessment pieces.
   ii. Refer to the school's Curriculum Framework which is regularly reviewed and referred to.
   iii. Maintain records of other assessment pieces in other formats, with regular reference to the syllabi.

j. Changes in Teaching Practices
   i. Not applicable at this stage. I have seen only limited application.
   ii. Both teacher centred or student centred.
   iii. One teacher has used the process to integrate programs in English, Social Science and IT. He has made templates which students are free to vary. They access their assignments from the portfolio site; criteria sheets are on the site; and he has made connections to outcomes from the syllabi.
   iv. A teacher has used the portfolios as a teaching tool, teaching the students how to use PowerPoint, with a view to teaching hyperlinking at a later stage.
   v. Another is teacher centred, where student progress is monitored over time and recorded for parent teacher interviews, with a view to saving to CD and providing a copy to parents
   vi. Most definitely changed conversations between teachers and students, teachers and parents, and students and parents? It's wonderful to have everything so readily accessible (assignments/video clips/assessment comments, etc.) and be able to share these at the touch of a button.
   vii. Students are enthused by the "whiz bang" of technology and want to participate!
   viii. It also clearly shows growth over time (e.g., children's reading) so parents can be better informed.
   ix. Potentially it will provide a different focus for ICTs because its use has much more meaning for students and teachers.

k. Literature
   i. I have accessed some websites recommended by T. Otto, in particular Dr Helen Barrett's site (Alaska) and the Highlands of Victoria.

ii. The following comment sums up an important feature of portfolios: “Doing this portfolio taught me more about technology, more about myself and above all more about who I want to be; who I am now and who I will be in 10 years time.” (From Digital Portfolios: Fact or Fashion by H. Woodward and P. Nanlohy).
iii. One of EQ’s goals is to make lifelong learners and in an increasingly technology-based world it is important that people are equipped with a variety of skills which they can apply in their everyday lives, be it at work or at home.

l. Digital Portfolios in Other Schools
  i. I like A. Fenney’s work and feel that it will be even more impressive when he includes a connection between outcomes and the work which is contained in it.
  ii. For younger students, using PowerPoint is a simple way of teaching both the process and hyperlinking.
  iii. The Crow’s Nest example (B. Butler) is, in my opinion, outstanding because it is multi-functional: it teaches, it records, it inspires students and is a great tool for conversations with parents.

m. Conversations
  i. Lots with principals and teachers! I facilitated a very successful session with many teaching principals from my district where one teacher presented his approach. Each principal was given a CD outlining the way he works with his students and (most importantly!) has a “How To” section which teachers can access in their own time. These principals were enthusiastic about the potential for using digital portfolios.
  ii. The principal liked the idea of monitoring progress over time. The idea of providing parents with a record of a year’s or seven years’ schooling appealed. The integrated approach was realistic and could “kill two birds with the one stone” (i.e., teach IT skills and record important student data at the same time).

n. Digital Portfolios Network
  i. All activities have been valuable because I have seen a range of techniques and am able to discuss a variety of options with teachers and principals. I have also become familiar with the tools which schools need to use.
  ii. Opportunities needed for people to apply the knowledge they are learning. The principals really appreciated the “hands-on” nature of the workshop I facilitated last week.
  iii. I like Neil’s idea of hosting a DP conference!!

15. Reflections on Digital Portfolios from the Toowoomba Principal Education Officer

a. Details
  i. In October, 2004, questions were emailed to N. Thorpe, Principal Education Officers (Performance Measurement), Toowoomba Education District, who returned the responses below be email. As PEO, he works with 32 schools in a range of student and school performance areas.

b. Purposes for Digital Portfolios
  i. Digital portfolios, once they are skilfully adopted by teachers, would become the critical assessment tool for portraying the richness, depth and breadth of student learning in classrooms.
  ii. The key purpose would be to provide students and teachers with a body of work, demonstrating achievement that allows them to reflect on their learnings to this point (distance travelled), and commence planning future learnings (learning for life).
  iii. Digital Portfolios will become a catalyst for evaluating teaching and learning and this will lead to significant change in how classroom learning is managed.

c. Design of Digital Portfolios
  i. Needs active participation of the learner
  ii. Needs a clear understanding of what the ‘end product’ (or “Presentation Portfolio”) should deliver.
  iii. Needs an Assessment and Reporting framework that enables student portfolios to be purposefully used for reporting to parents/employers/next level education authorities; as well as presenting an accurate portrayal of student learning against agreed criteria (Outcomes; School Curriculum Framework etc.)
  iv. School based technology should be that is accessible to students and staff; and have the capacity to provide for the recording and storage of student work.
  v. Schools should utilise existing technology and resources to keep costs low.

d. Management Issues
  i. Confidentiality and privacy provisions under current legislation will require the establishment of strong security provisions in schools.

   ii. Schools will need to address the issue of storage of portfolios that build from across the 13 years of schooling.
   iii. Current school technology plans (ICTs for Learning Agreements) will need to address whole of school resourcing and professional development in a more comprehensive way to ensure equity of access for all students and staff

e. Data Storage
   i. I would investigate web-based solutions to data storage provided a secure way of doing this could be found.

f. Other Issues
   i. I am concerned about Digital Portfolios and Prep to Year 3 students and teachers. This area of ICTs has been a 'poor cousin' in years past and is generally under funded and under resourced in most schools. There is an issue of equity in providing for ICTs these classrooms where digital portfolios will play a strong role in capturing the richness and speed of children's learning at this age.
   ii. A concomitant issue is the level of ICT skill of teachers in these year levels.

g. Curriculum Monitoring
   i. As referred to above, an Assessment and Reporting framework would be an essential part of the design of digital portfolios; or, the data in the digital portfolio should be easily transposed into an electronic reporting software.

h. Use of ICTs
   i. Stronger integration into the curriculum as Digital Portfolios provide a focus on presenting student work (projects etc.) that are assessable items demonstrating learning against the school's curriculum.

i. Digital Portfolio Network
   i. Hearing about and speaking to other teachers who are also beginning to work in this field.
   ii. Limited time to talk to others about what is happening in their schools.
   iii. Continue demonstrations by schools on what they are doing; encourage more sharing and discussion between participants.
   iv. More ideas and discussion of resources.
   v. KIS – Keep it simple - start simply with electronic folders for student work; gain experience with digital cameras/videos; work on simple software (PowerPoint) to present work. Involve students and encourage student development of and reflection upon their portfolios.
   vi. Explore with interested staff the concepts of Digital Portfolios and encourage experimentation and sharing - working towards a collaborative development of a digital portfolios framework for the school.

j. Literature
   i. David Nuiguida (Coalition of Essential Schools); Helen Barrett (Uni of Alaska) have both been influential. All through Internet Google searches.

k. Digital Portfolios at Other Schools
   i. Attendance at Woodcrest College PD day in April. Found their conceptualization of three levels of DPs good; A Fenney's work at Pozieres is probably the first Digital Portfolio I saw evidence of at the local level.
   ii. Many of the above Digital Portfolios did not have a strong link to assessment and reporting, though Woodcrest reported on the benefits of using Digital Portfolios in Parent Teacher interviews.

l. Documents
   i. Only documents developed relate to materials posted onto The Learning Place site, Woodcrest Notes, EdNA site, etc.

16. Planning Committee Meeting of the Toowoomba ePortfolio Alliance (TeA) (November, 2004)

a. Details
   i. Friday, November 11, 2004 at Toowoomba Education District Office.
   ii. Participants:
      T. Otto (Principal, Withcott State Primary School)
      S. Fuller (Principal, Pilton State Primary School)
      G. St Clair (Principal, Gatton State Primary School)
      C. Zilm (Principal, Toowoomba State High School)
      N. Thorpe (Principal Education Officer, Performance Measurement, Toowoomba Education District)
      M. Smith (Principal Education Officer, Performance Measurement, The Downs Education District)
      B. Dittman (Co-ordinator, TTMSCE)

b. Discussion
   i. Feedback from the October Workshop was discussed.
   ii. Ideas were discussed for the TeA Submission for the funding from the Education Queensland Strategic Curriculum Support initiative and Australian Government Quality Teaching Programme distributed by the Toowoomba Education District for Learning & Development (see appendix D.16), e.g., activities for 2005, Schools of Excellence, reference group of practitioners, professional development models and skill acquisition, site visits in Queensland and interstate, sponsoring of visitors to our network, information dissemination and collaboration, and the development of a presentation to introduce ePortfolios.
   iii. The Downs Education District funding was discussed and it was decided that the district's contribution would be in the form of a co-ordinator at the TTMSCE who would allocate part of their time to the network.
   iv. The role of the Digital Portfolio Network was discussed in light of the need to establish the Toowoomba ePortfolio Alliance to meet funding requirements. The name of the Digital Portfolio Network also needed to change to include the term "ePortfolios." It was envisaged that the two networks could co-exist, but this became confusing for participants and the two networks were formally combined at the next planning meeting.
   v. Progress on the SITE and ePortfolio Australia conference papers were discussed.

17. Funding Submission to the Toowoomba Education District

a. Details
   i. The Toowoomba ePortfolio Alliance (TeA) prepared the following submission for funding from the Education Queensland Strategic Curriculum Support (SCS) initiative and Australian Government Quality Teaching Programme (AGQTP) distributed by the Toowoomba Education District for Learning & Development. (Outcome: Received $A17000 for activities in 2005, $A14700 from SCS and $A2300 from AGQTP)
   ii. Participants:
      T. Otto (Principal, Withcott State Primary School)
      C. Zilm (Principal, Toowoomba State High School)
      B. Dittman (Co-ordinator, TTMSCE)
      C. Searchfield (Deputy Principal, Clifford Park Special School)
      G. St Clair (Principal, Gatton State Primary School)
      M. Haberman (Teacher, Centenary Heights State High School)
      M. Zilm (Head of Department, Centenary Heights State High School)
      L. Eilers (Principal, Helidon State Primary School)
      T. Mancktelow (Deputy Principal, Wilsonton State Primary School)
      N. Thorpe (Principal Education Officer Performance Measurement, Toowoomba Education District)

b. Aim of the Innovation
   i. To facilitate the development of student ePortfolios in the Toowoomba Education District as a catalyst to promote the delivery of curriculum, pedagogy, and assessment and reporting initiatives through the integration of ICTs in learning.

c. Objectives
   i. To develop and share conceptual frameworks on which to base ePortfolios and exemplary practices by supporting (a) schools to become outreach centres and (b) an expert reference group of practitioners
   ii. To provide training for school staff in requisite skills and software.
   iii. To disseminate information about ePortfolios through the existing Digital Portfolios Network and electronic medium such as The Learning Place site and EQ Discussion List.

d. Anticipated Outcomes
   i. Conceptual frameworks on which to base ePortfolios will be developed and shared. (An ePortfolio is the presentation of student achievement by linking multiple files: document; video; graphic; and sound).
   ii. Effective and innovative use will be made of existing school based ICT resources and expertise, and the ICT skills of staff and students will improve through an authentic application of the latest ICTs.
   iii. Teachers will reflect on contemporary practices and opportunities will be generated for school administrators, teachers, parents, and children to engage in new conversations about ICTs and learning and their place in the school's curriculum, teaching, and assessment practices.
   iv. Students will play an active role in constructing a record of their achievements leading to improved engagement and interest, opportunities for reflection, and a focus on a student centred approach to teaching.

   v. The relationship between primary and secondary schools will be strengthened as ePortfolios are shared from year seven to eight. (Middle Phase of Learning)
   vi. Outcomes will be disseminated to other schools in Queensland and beyond as a showcase of achievements in the Toowoomba Education District.
   vii. The processes developed by the TeA will become a model for other innovative projects.

e. Past History
   i. A group of self-motivated teachers and school administrators in Toowoomba and the The Downs established the Digital Portfolios Network (DPN) in May, 2004 to engage in professional learning about ePortfolios.
   ii. District funding of $A2000 supported staff development days in July (45 participants) and October (100 nominees), where examples of ePortfolio frameworks were presented and training provided in requisite skills and software. USQ pre-service students joined in activities.
   iii. A site was created at The Learning Place; an EQ Discussion List was established; the TTMSCE provided training venues and expertise; schools were visited to observe children working on portfolios; and papers prepared for the SITE 2005 and ePortfolio Conferences.
   iv. Teachers and school administrators were very positive about ePortfolios and the function of the DPN in the evaluation of activities. Six teachers were developing their own ePortfolio frameworks in 2004, while 42 teachers indicated they were ready to make a start in 2005.
   v. The DPN demonstrated that schools are committed to supporting the development of ePortfolios through their budgets for staff development, equipment replacement, and ICTs for Learning Agreement.

f. Schools Profile
   i. The alliance is made up of: two large high schools; a small, a middle-sized, and three large primary schools; a special school; and the TSMCE.
   ii. Schools in the Toowoomba, The Downs and West Moreton Education Districts have been co-operatively involved in DPN activities, which strengthen networking opportunities.
   iii. The “grassroots” interest in ePortfolios by teachers ensures that an investment in the DPN and TEA will be reflected in the classroom.

g. Community Demographic
   i. The schools are spread across the district from Toowoomba to the Lockyer Valley.
   ii. Literacy/Numeracy: Supports the recording of student activity and progress in core skill areas.
   iii. KLA Implementation: Supports the goals of the new integrated, outcomes based curriculum.
   iv. Supports the implementation of the Technology Syllabus.
   v. ICTs: Utilizes existing resources and builds on teacher and student skills. Supports the six key drivers of the ICT for Learning Agreement necessary for successful learning with ICTs.
      1. Learning, teaching, and the curriculum: Integrating ICTs into curriculum areas;
      2. Learning and development: Ensuring teachers have the capabilities of teachers to effectively engage with and use ICTs as a tool for learning;
      3. ICT infrastructure: Access to modern ICTs;
      4. Connectivity: Making connections with the people, data, and information required to learn;
      5. ICT support: Initiating innovative support measures; and
      6. Innovation: Acknowledging and encouraging schools and teachers.
   vi. Professional Standards for Teachers
      1. Provides flexible, innovative, and intellectually challenging learning experiences that integrate ICTs; and
      2. Encourages professional networks and critical reflection on professional practice.
   vii. Science Training: The flexibility of ePortfolios supports application in specific curriculum areas.
   viii. Middle Phase of Schooling: Assists teachers to address Key Action Areas of the Middle Phase of Learning.
      1. Focus and accountability: Provide rich, in-depth assessment information;
      2. Curriculum, teaching and assessment: Promote higher level of engagement and deeper understanding; and
      3. Transition: Improve continuity of information exchange and pedagogy across years 7-8, and from year 9 into the Senior Phase of Learning.
   ix. Reporting and Assessment: Aligns assessment and reporting with student activity in the new curriculum framework, reflects higher order thinking, and recognises the rich diversity of students’ talents and abilities.
   x. Supports the recording and collating of data from a wide range of sources for reporting purposes.

h. Potential Benefits and Impacts
    i. Students: Students have a closer involvement in the assessment and reporting process with improved engagement and interest and opportunities to be more reflective in their learning.
    ii. Teachers: The adoption of ePortfolios encourages a student centred approach to learning, teachers need support to implement ePortfolios because of the time and skills required.
    iii. Community: ICTs are now more common in the community, and ePortfolios are a visible indication that schools are using the new technologies in meaningful ways.
    iv. District: The district would be recognised as a leader in the development and implementation of ePortfolios.
i. Potential Negative Consequences
    i. There are no discernible negative consequences, because any teacher implementing ePortfolios no matter how simple or complex will learn about ICTs.
j. Challenges
    i. To encourage teachers to move from "that's a good idea" to "having a go."
    ii. To engage teachers in collaborating and sharing ideas by existing online processes such as the discussion list and The Learning Place.
k. Implementation Stages
    i. Teachers develop and access models of ePortfolios: In this district, individual teachers are developing ePortfolios, while teams of teachers are working on whole school approaches. The two groups demonstrate implementation in diverse contexts, offering a range of practices to share in different ways.
        $A18600 for 6 practitioners x 10 TRS: Teachers develop ePortfolios in their classrooms and are released to share their work with other teachers; and
        $A12400 for 4 schools x 10 TRS: Teams of teachers in 4 schools (2 prim, sec, special) develop ePortfolios and share as Outreach Centres within a cluster of schools.
    ii. Teachers are trained in ICT skills and software
        $A4000 to conduct a series of after school workshops culminating in a whole day conference;
        Teachers collaborate and access information; and
        $A4650 for 15 x TRS to release teacher(s) to manage The Learning Place site, stimulate collaboration via the discussion list, and produce an introductory kit for teachers interested in ePortfolios.
l. Resources to Sustain the Innovation
    i. Schools and individual teachers have demonstrated commitment to the development and implementation of ePortfolios through the work achieved in 2004.
    ii. As the concept develops and exemplars become available in 2005, the project will become more self-sustaining with a greater focus on mechanisms for collaboration.
m. Agreement
    i. We agree to comply with systemic reporting requirements, and will submit reports at the appropriate times as informed by the reference group.

18. Planning Committee Meeting of the ePortfolio Alliance (eA) (December, 2004)

a. Details
    i. Friday 8 December, 2004 at the Toowoomba Education District Office
    ii. Participants:
        T. Otto (Principal, Withcott State Primary School)
        S. Fuller (Principal, Pilton State Primary School)
        G. St Clair (Principal, Gatton State Primary School)
        C. Zilm (Principal, Toowoomba State High School)
        N. Thorpe (Principal Education Officer, Performance Measurement, Toowoomba)
        M. Smith (Principal Education Officer, Performance Measurement, The Downs)
        B. Dittman (Co-ordinator, TTMSCE)
b. Discussion
    i. The Digital Portfolio Network and Toowoomba ePortfolio Alliance combined to create the ePortfolio Alliance.
    ii. Learning and Development funding to the value of $A17000 to be distributed to schools. An "expression of interest" proforma is to be forwarded to principals at the start of 2005 so that they may apply for 10 days of TRS for each of four individual teachers and three schools.
    iii. TRS refers to Education Queensland's Teacher Relief Scheme, and is used to replace teachers who are absent from their class either on leave or attending staff development. A replacement teacher costs approximately $A300 for each day that a class teacher is released.

iv. The TTMSCE will support the alliance by allocating a teacher one day each week in 2005 to manage The Learning Place project room and discussion list, and by providing teacher training for three afternoon sessions and the whole day on the October Staff Development Day.

v. T. Otto reported on the ePortfolio Conference, Melbourne. The Main Speakers were Serge Ravet (European Institute for eLearning); Elizabeth Hartnell-Young (University of Melbourne); Helen Barrett (University of Alaska); and Kathryn Chang Barker (FuturEd Consulting). Topics raised at the conference included: purposes for ePortfolios; lifelong learning; reflection for deep meaning; memory boxes that reflect what people value; assessment for learning V assessment of learning; positivist V constructivist theories of learning; laboratories or environments where students construct meaning; lessons from written portfolios, e.g., combining paper and digital portfolios; digital storying telling and the Australian Centre for the Moving Image; networks of educators working across schools; and the uniqueness of our network.

19. Report on Networking Activities in 2004

a. Details

  i. This report on networking activities throughout 2004 was prepared by T. Otto in December, 2004 and distributed to principals at meetings and to the Executive Director, Toowoomba Education District.

b. Summary

  i. The Digital Portfolios Network (DPN) is a group of self-motivated teachers and school administrators in Toowoomba and the The Downs engaged in professional learning about ePortfolios.

  ii. The Network is responding to the need for an approach to assessment and reporting that is appropriate for Queensland’s integrated, outcomes based curriculum and to reflect higher order thinking.

  iii. The enthusiasm for ePortfolios is at a grassroots level, because teachers can see the benefits for children.

  iv. Better use is made of existing ICT resources, and there are opportunities for administrators, teachers, parents, and children to engage in new conversations about ICTs and learning.

c. Aim of the Project

  i. The Aims, Objectives, Anticipated Outcomes, Relationship to Education Queensland Imperatives, Potential Benefits, and Challenges are the same as in the submission for funding in appendix D.16.

d. Activities in 2004

  i. A group of self-motivated teachers and school administrators in Toowoomba and The Downs established the Digital Portfolios Network (DPN) in May, 2004 to engage in professional learning about ePortfolios.

  ii. District funding of $A2000 supported staff development days in July (45 participants) and October (100 nominees), where examples of ePortfolio frameworks were presented and training provided in requisite skills and software. University of Southern Queensland pre-service students joined in activities.

  iii. Feedback on the network approach to supporting professional learning about ePortfolios through shared ideas, skills, and resources has been very positive. Six teachers were developing their own ePortfolio frameworks in 2004, while 42 teachers indicated they were ready to make a start in 2005 (see attached evaluation summary).

  iv. A site was created at The Learning Place; an Education Queensland Discussion List was established; the TTMSCE provided training venues and expertise e.g., digital video capture, editing, rendering, and CD-ROM production; schools were visited to observe children working on portfolios; and papers prepared for the SITE 2005 and ePortfolio Conferences.

  v. The DPN demonstrated that schools are committed to supporting the development of ePortfolios through their budgets for staff development, equipment replacement, and ICTs for Learning Agreement.

  vi. Network activities have attracted interest from outside the two districts, which strengthens networking opportunities.

  vii. The network includes large high schools, small rural and large urban primary schools, special schools, and the Technology Mathematics and Science Centre of Excellence.

e. Plans for 2005

  i. The ePortfolio Alliance was established to allocate $A17000 from Education Queensland Learning and Development funds for the project for 2005. The funds will be used to assist teachers to develop and access models of ePortfolios by

    supporting practitioners: teachers develop ePortfolios in their classrooms and are released to share their work with other teachers; and supporting Outreach Centres: teams of teachers in schools develop ePortfolios and share within a cluster of schools.

ii. Examples of ePortfolio frameworks are to be prepared as cases for the network to access.
iii. Second generations of cases are to be recorded as teachers adapt the examples of ePortfolios they have seen to meet their needs and context.
iv. A series of after school workshops will support teacher training in ICT skills and software, culminating in a whole day conference.
v. Teacher collaboration and access to information will be supported by further developing The Learning Place project room; stimulating collaboration via the discussion list; producing an introductory kit for teachers interested in ePortfolios; and visiting other sites in Queensland and interstate.

20. Planning Committee Meeting of the ePortfolio Alliance (eA) (February, 2005)

a. Details
   i. Wednesday, February 16, 2005 at Clifford Park Special School
   ii. Participants:
      T. Otto (Principal, Withcott State Primary School)
      C. Searchfield (Deputy Principal, Clifford Park Special School)
      S. Fuller (Principal, Pilton State Primary School)
      N. Thorpe (Principal Education Officer, Performance Measurement, Toowoomba)
      T. Angus (Teacher, TTMSCE)
b. Discussion
   i. Seven schools submitted "expressions of interest" in applying for a share of the $A17000 provided to the ePortfolio Alliance from the Education Queensland Strategic Curriculum Support initiative and Australian Government Quality Teaching Programme distributed by the Toowoomba Education District for Learning & Development. The seven "expressions of interest" are recorded in appendix F so that comparisons may be drawn between what the schools intended to achieve with the funds, and what eventually happens.
   ii. Applications from six of the schools were approved to receive nine days of TRS each to the value of $A2700: Clifford Park Special School; Helidon, Glenvale, and Wilsonton State Primary Schools; and Centenary Heights State High School. (To comply with a participant's request to remain anonymous, one school has not been included in the list).
   iii. T. Otto withdrew the application from Withcott State Primary School so that the other schools would receive funding substantial enough to make a difference. $A800 of the funding would be held at Withcott to cover costs of Workshops and miscellaneous expenses.
   S. Fuller proposed that Pilton State Primary School would participate but would not need funding.
   iv. T. Angus was allocated one day each week by the TTMSCE to develop The Learning Place project room and manage the discussion list.
   v. After school Workshops are to be held in 2005 on March 9, May 25, August 3, and a whole day session on the October 10 Student Free Day
   vi. On these days, funded schools are to make a presentation of their progress in the form of a case, with Clifford Park Special School on March 9. T. Otto to discuss the information resource he prepared on ePortfolios (see appendix E), and the TSMCE to provide presenters for hands-on skill development. T. Otto to prepare a flyer and survey schools as to perceived needs for staff development days.

21. Instructions for Schools Receiving Funds

a. Details
   i. A letter containing the information below was forwarded by T. Otto to the principals of schools receiving funding (as above).
   ii. The principals were advised that they had secured $A2700 through the ePortfolio Alliance (eA) to support the development of ePortfolios in their schools, and that the funds originated from the Education Queensland Strategic Curriculum Support initiative and Australian Government Quality Teaching Programme.
   iii. A cheque was forwarded to each school and individual schools were responsible for spending the funds.
   iv. The principals were advised of the other schools participating in the project so that they could communicate with each other.
b. Advice on the Use of the Funds
   i. The funds are predominately for TRS days (equivalent to nine days for each school). How those days are used will vary from school to school. The two main outcomes are (a) that the

development of ePortfolios is progressed in your school; and (b) that your experiences are shared with others.

c. Advice on the Sharing Process
   i. We will let schools know of your participation in the project, and they may approach you.
   ii. You may contact schools e.g., feeder or cluster, and offer assistance.
   iii. Each participating school will be asked to make a short presentation of their progress at one of the after school workshops to be conducted at the Toowoomba Technology Mathematics and Science Centre of Excellence on the dates below. Clifford Park Special School has kindly offered to make a presentation at the first session.
      Wednesday, March 9, 2005, 4.00 p.m. to 6.00 p.m.
      Wednesday, May 25, 2005, 4.00 p.m. to 6.00 p.m.
      Wednesday, August 3, 2005, 4.00 p.m. to 6.00 p.m.
      Monday, October 10, 2005, 9.00 a.m. to 3.00 p.m.
   iv. Each participating school will be asked to record their achievements briefly in the form of a case e.g., context, purpose, goals, issues, and software. The cases will be posted at The Learning Place.
   v. T. Angus at the TTMSCE is supporting the project by managing The Learning Place site and discussion list. Relevant information will soon be available at The Learning Place, and the discussion list should soon be active. We encourage your staff to make use of these facilities.

22. Discussion List Exchanges

a. Discussion One March, 2005
   i. N. Thorpe to S. Fuller: Yesterday you mentioned that you had the opportunity to view the *Kahootz* software. I understand it may be available from the Aust Children's Television Foundation. Can you please let me have more information on this?
   S. Fuller to N. Thorpe: *Kahootz* describes itself as a 3D multimedia toolset. It is produced by the Australian Children's Television Foundation and is available as a download from www.kahootz.com . The download is apparently complete except for the ability to save. The intent of the website is to connect users and apparently aid sharing of "Kahootz expressions' (completed animations). Examples are available at [link]. Unfortunately, you need the demo or full software to view them. But the developers are working on being able to save the animations (which can be a series of linked scenes) as .avi files so they can exported or imported. Some people will really like what this software can do. It is well priced for schools - 5 pack/10 pack/20 pack at $A264/$A407/$A632.

b. Discussion Two April, 2005
   i. S. Fuller to List: Can anyone point me in the direction of a guide to using *FrontPage* that can be followed by students at a Year 4/5 level (and preferably, at a Year 3 level)?
   ii. T. Angus to S. Fuller: I am attaching a step-by-step outline that I have used to introduce Year 6/7 students to *FrontPage*. Might be useful with other level students. Good luck!

c. Discussion Three October, 2005
   i. L. Brosnan (ICT Co-ordinator, Glenvale State Primary School) to T. Otto: Could I please have a copy of some of your ePortfolio examples to show my computer committee? I've been thinking about how I'm going to use some of those TRS days and I think I'll get teachers off in year level blocks (say morning, middle, and afternoon session) and we'll initially look at tools (scanners, cameras, and web cams), or using PowerPoint and hyperlinks etc. Year levels will have to get together and decide what tools and software they want to explore, before the session so I can have things ready for them. Sound like a good idea?

d. Discussion Four January, 2006
   i. Neil Thorpe to List: This is to advise you that the previous email address for our discussion list digitalfolios@qed.qld.gov.au has now undergone a change. It is now digitalfolios@discussions.eq.edu.au You have all been migrated across to this new list address. Happy ePortfolioing in 2006!

e. Discussion Five February, 2006
   i. Participant (teacher) to T. Otto: Last year I attended one of your sessions on ePortfolios. We now have folders on our server and are ready to begin! I thought there was a template on the disk you gave out, but I can't find one! Do I need to look again? If not, does such a thing exist and would you share it?
   ii. T. Otto to participant (teacher): There are a number of ways to go about the design of a student's ePortfolio. Some schools, e.g., Helidon, designed a front page (opening page) that all students use. It includes the school badge, name and motto etc. Otherwise children can design their own opening page. It depends really on how much control you want over design and content in the various elements of the ePortfolio, e.g., the first page that opens, organisation of the links, content, etc. There are arguments either way and there is certainly

no right or wrong way. It is what works for yourself and the kids. There are design ideas under "cases" on the CD. Brett Butler has provided a template under "Click for Bonus Resource 2 - ePortfolio Resources - Digital Portfolio CD - "An ePortfolio Template." This is more secondary oriented though. Templates are probably not a lot of use because every teacher is different in what they are looking for. Creating a template is not a big job anyway, and is part of the process of ownership - what I create I own! It is probably more important to do a flow chart with the children on what you want in the ePortfolio. My teachers came up with the flowchart under "Cases - Withcott." This gives direction as to how the content will be hyperlinked and organised, e.g. naming folders. Hope this helps. Get back to me if more needed or let me know how you got on.

f. Discussion Six February, 2006
   i. C. Lapworth to N. Thorpe: Trying to see if there would be any interest in the district re: advanced "Flash" training especially "action scripting". I'm just casing prices at the moment I haven't spoken to Chris about it yet, but do you know who might be using flash, or who might know who might be using Flash so that if we can organise it we can spread the cost of getting an expert up. The idea would be to have an informal bring your own project and work all day helping each other. I just would like to know what demand there might be for it.
   ii. N. Thorpe to C. Lapworth: I think that an advertised day, self funded through participants, is a good idea. Would the Student free Day in Term 2 be an option to reduce teachers attendance costs? Perhaps we could make it a joint activity between the ePortfolios Alliance and Cos' reference group - it might be a productive joint venture that may lead to better things in future. I think we should call a meeting of the ePortfolios organising group to discuss and plan the first part of the year.
   iii. T. Otto to C. Lapworth and N. Thorpe: I am sure there would be interest in a Flash training session. The "bring your project and work on it together" idea fits in with the approach we will be taking with ePortfolios this year. I am holding some ex Learning Place money and the TTMSCE has allocated $A2000 for ePortfolios, so there would be funds available to support your suggestion. Participants could contribute to this one as well, particularly if we get in an "expert." Do you have someone in mind? Are other local people available to lend a hand? Would you like me to arrange a day through our ePortfolio network or would you prefer Cos Marendy and his reference group to handle it? I think a whole day is needed on this. I'll start planning ePortfolio sessions soon. Just getting past the settling in period.
   iv. C. Lapworth to N. Thorpe and T. Otto: A. Smith and I are trying to get a complete copy of the flash training bundle made by learnflash.com. This is 16 hours of flash tutorials which should keep us happy. This is proving to be somewhat difficult. However if we can get it then we're thinking a "bring your own project, look for suitable tutorial to help, help each other" kind of concept. Problem being if you are playing around like me often you're beyond what an expert might cover in a day with you, due to them having to cover content for the lowest common denominator. These tutorials also have the advantage of being able to be replayed independently repeatedly. Ultimately it would be nice to have a little network of flash users. What do you think?

g. Discussion Seven February, 2006
   i. Participant (teacher) to N. Thorpe: Just letting you know in regards to ePortfolios and integrating ICTs that [our school] is using ePortfolios for all students this year. I have already run one inservice on them for surrounding small schools in the cluster but would be happy to help out any other small schools with questions that are nearer to me than the Toowoomba alliance near me.
   ii. N. Thorpe to participant (teacher): I'm a little late responding this message. This is a fine initiative and congratulations to you for this work. The ePortfolios Alliance will begin planning for this year's activities and we'll keep you in mind. Also, watch for some Learning Place/Learning Objects PD that is to happen in the Chinchilla area.

h. Discussion Eight February, 2006
   i. Participant to List: Saw this but didn't have time to read it (7 other good articles related to my field found from the same newsletter). Thought it might be of interest to some. I couldn't say it more plainly myself (Electronic Portfolios for Whom? EDUCAUSE Quarterly February 8, 2006). "The literature doesn't discuss ePortfolio use to meet student needs and concerns but to support administrative efforts to solve long-term curricular issues." And I agree with this assessment: "Implementers who have not thoughtfully addressed the key issues outlined here will eventually come crashing down." The author writes that there is hope - but how much damage will the institution-centered initiatives cause in the meantime?

ii. Participant to List: Saw this mentioned in an article on using digital portfolios. "At the end of their last primary year, the students presented their ePortfolio individually to their teachers for the first year of secondary school as part of their transition program."

23. Workshop for Teachers in the Early Phase of Learning (February, 2005)

a. Details
   i. Friday, February 25, 2005, Highfields Cultural Centre, Toowoomba, 11.00 p.m. to 12.30 p.m.
   ii. Teachers of children in years one to three meet regularly to discuss issues relating to the Early Phase of Learning.
   iii. T. Otto was invited by N. Thorpe, Principal Education Officer (Performance Measurement), Toowoomba Education District, to conduct a session on ePortfolios. The session was attended by 35 teachers.

b. Session
   i. T. Otto (principal) and S. Denman (Teacher Librarian) from Withcott State Primary School presented the PowerPoint based ePortfolio of a year one child depicting three videos of his reading from March, 2004 to November, 2004, and a year six child depicting self, family, and school work.
   ii. The information resource "ePortfolios: A learning tool for primary and secondary students (Summary Version)" (see appendix E) was distributed. T. Otto discussed the main points and demonstrated the use of the equipment, e.g., digital camera, digital video camera, and scanner. It was stressed the information resource would be of more value after teachers had started on an ePortfolio to provide them with a guideline and more ideas, and that it was important simply to make a start.
   iii. L. Brosnan (Project Co-ordinator for ePortfolios) from Glenvale State Primary School (funded by the ePortfolio Alliance) provided a PowerPoint presentation about a year one child. She discussed aspects of the development of the ePortfolio, and how the school intended to proceed further.
   iv. T. Otto discussed the elements of a Constructivist Learning Environment as an Instructional Design (issue, information resources, cases, tools, and social and contextual support) and how these were being applied in professional learning associated with the ePortfolio Alliance, and how teachers could apply the same Instructional Design in their classrooms to produce ePortfolios.
   v. The proposed activities of the ePortfolio Alliance were outlined.
   vi. A planning document for the implementation of ePortfolios in their classroom (adapted for infant teachers from section 6: Questions to Stimulate Reflections about Digital Portfolios) was distributed, but there was insufficient time to discuss the document in groups.
   vii. Participants were asked to evaluate the session.

c. Comments by Participants: Demonstration of ePortfolios
   i. Demonstrated usefulness of portfolios and generated ideas on what to include
   ii. Very good to see and take ideas home. Examples are very valuable.
   iii. Need more examples for ideas.
   iv. Would like to have seen more.
   v. Great ideas. Would like to see more.

d. Comments by Participants: Information Resource on ePortfolios
   i. Good information on protocol.
   ii. Good to hear from teachers making ePortfolios.

e. Comments by Participants: Demonstration of Equipment
   i. Need to see one in operation.
   ii. Need to demonstrate use of these materials.
   iii. Bit rushed but useful and basic.
   iv. Would be good to see something made from scratch.
   v. Probably need more hands-on in this area. Good initial review of materials.

f. Comments by Participants: General Comments
   i. The schools implementing these need sufficient and working hardware plus teacher support.
   ii. I've gained some more ideas to build on this session. It was excellent.
   iii. It was good to see how you can use them in context and what you can use.
   iv. Overall session very informative and basic level which was appropriate. Gave purpose for me and very motivating.
   v. Great presentation. I'm inspired to try! Practical and to the point.
   vi. Need support on where to actually start when computer skills are very basic.
   vii. Excellent!
   viii. Excellent introduction to using ePortfolios.
   ix. Thanks for your input.

x. Only beginning to dabble in this. Really keen to do more. Great to improve home/school relationships and getting information home.
xi. Well worth while professional development.
xii. Would like to utilize this as a Support Teacher (Learning Difficulties).
xiii. Looks great but must have the time to do it.

g. Ratings

Table D.3: Workshop Evaluation Summary (February, 2005)

Sessions	Usefulness					Total	Mean
	1	2	3	4	5		
Demonstration of ePortfolios		1	8	10	9	28	3.9
Discussion about ePortfolios		1	6	13	8	28	4.0
Demonstration of equipment		1	14	5	8	28	3.7

h. Planned use of Digital Portfolios
i. Are you using digital portfolios? Yes 6 No 22
ii. Do you plan to use digital portfolios? Yes 28 No 0

i. Suggestions for Further Workshops

4 x demonstration/hands-on with tools
4 x demonstration of ePortfolios
1 x discussion/evaluation
3 x video editing
5 x planning ideas/reflection/implementation issues
1 x Where to start for beginners?
1 x PowerPoint
1 x file management
1 x steps to skill children
1 x FrontPage
2 x web cam
2 x hyperlinking

24. After-School Workshop (March, 2005)

a. Details
i. Wednesday, March, 9, 2005, TTMSCE, 4.00 p.m. to 6.00 p.m.
ii. An information flyer was emailed to the principals of all schools in the Toowoomba and The Downs Education Districts.
iii. The session was attended by 58 teachers, which was close to the capacity of the two computer rooms (60). A further 30 teachers who nominated, making a total of 88 altogether, were offered an alternate session early in term two. Some teachers had attended the ePortfolio session at the Early Phase of Schooling day and attended this session to find out more. A teacher drove 160 km from Meandara to attend.

b. Session
i. C. Searchfield outlined the work at Clifford Park Special School and demonstrated videos they had taken. One purpose for their ePortfolios was to record the learning and development of children with special needs, which is not easily achieved by traditional approaches. Videos are able to capture more detail and highlight incremental growth.
ii. T. Otto gave a short introduction to the information resource booklet *ePortfolios: A learning tool for primary and secondary students.* It was stressed that this resource would be of more value after teachers had commenced work on ePortfolios by providing guidelines and ideas, and that it was important simply to make a start. The elements of the Instructional Design of the project (issue, information resources, cases, tools, and collaboration) were listed, and it was explained how the activities of the ePortfolio Alliance correlated with these elements. It was further explained that this model for professional learning is built on constructivist principles and could be applied by teachers in the classroom.
iii. The operation of a web cam was demonstrated to the whole group and was well received.
iv. Participants moved to two computer rooms with C. Lapworth and A. Smith for a skills session in Movie Maker. One group was at a basic level and worked with still pictures only, while the other group worked with videos. The presenters were experienced and moved at an appropriate pace, which is important for teachers who may be low in confidence.
v. Participants were asked to evaluate the session.

c. Comments by Participants: ePortfolios at Clifford Park Special School
i. Very good.
ii. Lots to think about.
iii. Good to see how ePortfolios are being used.
iv. Good! Thoughtful!
v. Good sharing session.
vi. We must share our work.

vii. A great intro into what real people/teachers are doing. Thank you Clifford Park.
viii. Great use of my time.
ix. Good to see effective examples in practice. Something for us to work toward.
x. Good. Can make use of this as it seems straight forward.
xi. Very clear. Good insights about the use of ePortfolios.
xii. Good to see what's happening around the place.
xiii. Good to see a practical application.

d. Comments by Participants: The booklet - ePortfolios: A learning tool
   i. Very comprehensive.
   ii. Yes!
   iii. Haven't read yet.
   iv. Will look at it properly.
   v. Helpful. Thank you.
   vi. Good work Tom.
   vii. Looks good.
   viii. I am sure when I sit down and read it, it will be a great tool.
   ix. Good resource.
   x. More time to process the idea and the technology.
   xi. Looks great! Hope it will be very helpful.
   xii. Comprehensive resource. Great!
   xiii. Good info.
   xiv. Very easy to follow.
   xv. Very helpful. Clear explanations. Clears up some of the "mumbo jumbo." Very helpful comments and insights by the presenter. A useful session even for the beginner.
   xvi. Need more time to look back at and use booklet. Great for resource.

e. Comments by Participants: Movie Maker
   i. Excellent.
   ii. Inspiring.
   iii. Great! Now just need time!
   iv. Now I understand.
   v. Great hands-on.
   vi. Already completed this session before.
   vii. These hands-on sessions are invaluable for those folk just embarking on the journey.
   viii. Must have hands-on training.
   ix. Excellent. Thanks for walking us through.
   x. Just brilliant. Ash was great and extremely patient. Thank you. Thank you.
   xi. Great fun. Learnt a lot. Ash was very helpful. Very informative program and easily used. Looking forward to using it at school and home. Very beneficial.
   xii. Fantastic to have hands-on access.
   xiii. Great! Well presented and practical/helpful.
   xiv. Went very well. Good pace and demonstration.
   xv. Excellent presentation. Great pace, easy to follow, good to play.
   xvi. Great, but unless using often will forget. Great if studying media in high school.
   xvii. A great session. Very helpful. Clear presentation. A good supply of computers.
   xviii. Looks like good fun. Very useful. Presenter most patient.
   xix. Great tutor. Step by step. Easy to navigate.

f. Comments by Participants: General
   i. This is very helpful. Now I just need time to practice!
   ii. More play time on computers but great intro.
   iii. Longer lessons on computer.
   iv. That was great! But much more time is needed to play around.
   v. Great sessions. If only we had more time to explore and learn.
   vi. Informative workshop.
   vii. Full of info, not enough time.
   viii. More time to play with supervision.
   ix. Will need to practise before attempting in school.
   x. Great fun. Can't wait to experiment.
   xi. Very excited.
   xii. Well prepared. Covered lots in a short time. Will go home and have a go.
   xiii. Fabulous. Thank you Ash! What an amazing program. Love it!
   xiv. Good format. Thank you.

xv. Movie Maker is useful for a teacher of a primary class but a little difficult to have time for primary students to access unless your school has a computer room. My school has two computers per class.
xvi. Fantastic!! Thank you all very much.
xvii. Really good info. Very practical.
xviii. Great session. I would like more of the same. Excellent afternoon. Thank you!!!!
xix. Great room to work in! Easy to see and do.

g. Ratings

Table D.4: Workshop Evaluation Summary (March, 2005)

Sessions	Usefulness					Total	Mean
	1	2	3	4	5		
ePortfolios at Clifford Park		1	7	16	21	45	4.2
ePortfolios: The Booklet		1	6	16	19	42	4.2
Movie Maker		1	1	7	39	48	4.8

h. Participants' suggestions for Future Workshops
i. What's effective in ePortfolios and what other schools are finding works well.
ii. Hearing more success stories and seeing working examples.
iii. Examples of digital portfolios from other schools.
iv. Web addresses for more information.
v. Training in digital photography, storage of photos.
vi. Technical training using the tools.
vii. Hands-on workshops regarding template design, editing, etc.
viii. As long as it is hands-on it does not matter.
ix. Actual hands-on time for putting together a portfolio sample.
x. Not really sure yet.
xi. Reflective appraisement by children.
xii. Storage and removing files.

25. Planning Committee Meeting of the ePortfolio Alliance (eA) (April, 2005)

a. Details
i. Thursday, April 21, 2005 at a participating primary school
ii. Participants:
T. Otto (Principal, Withcott State Primary School)
C. Searchfield (Deputy Principal, Clifford Park Special School)
L. Eilers (Principal, Helidon State Primary School)
S. Fuller (Principal, Pilton State Primary School)
T. Mancktelow (Deputy Principal, Wilsonton State Primary School)
T. Angus (Co-ordinator, TTMSCE)

b. Discussion
i. A Workshop was organised for the May, 25, 2005 at TTMSCE from 4.00 to 6.00 p.m. Committee members were satisfied with the previous structure of these sessions.
ii. S. Fuller demonstrated Photo Story 3 and offered to demonstrate the program at the Workshop. He was to distribute a sample presentation through the discussion list. (Outcome: Enacted)
iii. Funded schools reported on their progress. L. Eilers (Helidon) and T. Mancktelow (Wilsonton) offered to make presentations at the Workshop.
iv. Next meeting to be held four weeks before the August Workshop.

26. After-School Workshop (May, 2005)

a. Details
i. Wednesday, March 25, 2005, TTMSCE, 4.00 p.m. to 6.00 p.m.
ii. An information and nomination sheet was emailed to the principals of all schools in the Toowoomba and The Downs Education Districts. Nominations were returned by email or fax.
iii. The session was attended by 81 teachers, nine short of the 90 spaces available in the three computer labs. These teachers represented 23 schools. Of the 22 schools represented in the March session, 16 were again represented at this session. 33 teachers from the March session attended the May session. Some teachers had clearly "graduated" from Introductory Movie Maker to Advanced Movie Maker.

    iv. A CD-ROM was prepared to distribute to all schools across the two districts and included a video recording of the first session, notes and presentations, and other material relating to ePortfolios.
    v. Approximately 20 teachers from a primary school did not attend but expressed an interest in viewing the video of the first session.

b. Session
    i. L. Eilers, principal at Helidon State Primary School, presented a fifteen minute session on the work they had achieved in developing a whole school approach to ePortfolios (see appendix F.10.C for the transcript). A template had been designed for the front page of each student ePortfolio so that there was continuity in appearance across the year levels. Content varied according to the age and needs of the children, and the children had choices in the way the content was presented. Hyperlinked pages in PowerPoint were used to organise the collection of children's work. The presenter commented on the capacity of year one children to hyperlink after being shown four or five times, and that there is a great deal of teacher learning involved. Samples of early writing were scanned for inclusion.
    ii. T. Mancktelow, deputy principal at Wilsonton State Primary School and three teachers from his school presented a fifteen minute session on the use of Movie Maker to edit videos taken of student activities such as the presentation of projects. The teachers commented on the support that had been provided by T. Mancktelow in his role as deputy principal, for example, by getting them started on the use of software (see appendix F.11.C for the transcript).
    iii. S. Fuller, principal at Pilton State Primary School, presented a fifteen minute session on how to use Photo Story 3. He had previously distributed through the discussion list a presentation created with Photo Story 3 that told the story of a car wash fund raising event.
    iv. An information sheet was distributed outlining future activities of the alliance. T. Angus spoke about her work with The Learning Place.
    v. Participants moved to three computer rooms with C. Lapworth, A. Smith, and T. Angus for a skills session on the use of Web Cams, Introductory Movie Maker working with still pictures only, and Advanced Movie Maker working with videos.
    vi. Participants were asked to evaluate the session on the sheet provided.

c. Comments by Participants: Whole School Approach
    i. Thank you for a very professional and obtainable show.
    ii. It is excellent to see how other schools are using ePortfolios and how they are problem solving along the way. Very encouraging!
    iii. Well done. Have achieved a lot in a small amount of time.
    iv. Great to see the hassles that have been overcome to achieve a great result. Good combination of student and teacher control.
    v. Great to provide vision for what is possible and how ePortfolios can be used throughout a school, what it could look like.
    vi. Very good! Great to see how years one's to year seven's can all participate. A professional look.
    vii. Well done. Good examples of the use of ePortfolios.
    viii. Similar to what we plan to use.
    ix. Some great ideas.
    x. Very clever. Loved that year one's can do it.
    xi. This was very interesting, useful down the track.
    xii. I really liked this a lot.
    xiii. All the below sessions encouraged me to keep on trying and to work to overcome the various techno problems we are experiencing.
    xiv. A good intro to ePortfolios.
    xv. Great practical ideas.
    xvi. Wow!
    xvii. Very good.
    xviii. Very clever. It's good to see a balance between teacher and child input.
    xix. It is good to hear how other teachers are using ePortfolios.
    xx. This was an excellent presentation. It looks like a very user friendly useful portfolio
    xxi. Informative.
    xxii. Good to see different grade levels.

d. Comments by Participants: Movie Maker in the Classroom
    i. Yes, we all have trouble and time is our problem as well. Thank you.
    ii. Another good presentation displaying a range of ideas and uses.
    iii. Gave a variety of environments and purposes for ePortfolios.
    iv. Year five better, but others didn't seem to relate.
    v. Good to see the evolution process of learning the new technology.

vi. Excellent range.
vii. Useful ideas.
viii. Really good, especially for Special Ed.
ix. Handy tips - learning from other's mistakes.
x. Good to hear about processes.
xi. It is good to hear how other teachers are using ePortfolios.
xii. A good presentation.
xiii. Interesting.
xiv. Time to learn is the key.

e. Comments by Participants: Photo Story 3
   i. This looks great. I can't wait to try.
   ii. I have heard of this program. It was nice to see it in action.
   iii. Great. It is really easy to use.
   iv. Useful look at a program I have not encountered before.
   v. Looking forward to trialling this with farm visit photos from this week's excursion. Thanks.
   vi. Great alternative, good for students to use and easy to understand. Great presentation.
   vii. Well presented. Great program.
   viii. Very useful.
   ix. Great display of program.
   x. Would love to try this.
   xi. This seems a useful and easy program to apply to the classroom.
   xii. It was very worthwhile.
   xiii. Very cool.
   xiv. Very useful program seems quite simple to use with many applications.
   xv. Interesting idea.
   xvi. An interesting presentation. The end product was worthwhile.
   xvii. Good to see how easy it is.

f. Comments by Participants: General
   i. Thank you Ash for being ever so professional and giving us the time to drink all of the information. Wonderful.
   ii. Great extension of last session. Thanks.
   iii. Good work. I learnt about multi audio which I can use. Good!!
   iv. A bit fast for first exposure.
   v. Helpful content. Well presented.
   vi. Would like to repeat this. I got lost, not enough prior knowledge.
   vii. Lots of handy hints e.g., more than one audio.
   viii. Very useful. Thank you!
   ix. Great instruction. Time not long enough. Excellent program for the class.
   x. More time needed.
   xi. Going well. Sorry I have to leave early.
   xii. Well paced. Not too fast.
   xiii. Explained very clearly and I enjoyed playing.
   xiv. Good practice.
   xv. All excellent and very worthwhile.
   xvi. Very good, interesting, informative.
   xvii. Great session. Good pace and info presented easy to understand.
   xviii. Also useful for using videos and photos more effectively.
   xix. Great to have "hands-on" time.
   xx. Very good.
   xxi. A little too basic. I should have gone to the other one. Presenter did a good job though at introducing moviemaker.
   xxii. This is my second lesson and I feel more comfortable at using the software.
   xxiii. Great. Will have to make time to do at school.
   xxiv. Very informative.
   xxv. Very well explained in all steps.

g. Ratings

Table D.5: Workshop Evaluation Summary (April, 2005)

Sessions	Usefulness					Total	Mean
	1	2	3	4	5		
Helidon: Whole School Approach			1	18	19	38	4.5
Wilsonton: Movie Maker		1	10	12	13	36	4.0
Pilton: Photo Story 3			2	11	26	39	4.6
Movie Maker Introductory			2	4	9	15	4.5
Movie Maker Advanced			2	5	6	13	4.3
Web Cams				4	5	9	4.6

h. Suggestions for Future Workshops

i. So much to learn, so little time. A review and maybe some handouts for us to ‘try’ at class. Burning MM to DVD to play on DVD’s.
ii. Web cam. Setting up ePortfolio templates with hyperlinks.
iii. More hands-on - Moviemaker advanced.
iv. Hyperlinking, saving, packaging on CD, saving on PDF file.
v. PDF file. Hyperlinks.
vi. More information on The Learning Place and its usefulness. Sharing with other schools in alliance.
vii. Saving as a PDF file.
viii. Later start time for those travelling long distances to attend.
ix. Structure schools have used for recording of ePortfolio information e.g., use and record what information for each year level. Whole School Plans.
x. Longer time for practical.
xi. How to make a template.
xii. Will be on leave.
xiii. Keep up the great work and keep us informed.
xiv. Setting up computers so all these things run.
xv. Photo editing software e.g., Paint Shop Pro.
xvi. Using blogging for classrooms.
xvii. Can Japanese script be keyed into the movie??
xviii. Web cam with a specific focus on running records in the upper school.

i. Progress with ePortfolios

i. We are still playing with it and using it without students at the moment. Still setting up PowerPoint, scanner and learning to hyperlink. Have gathered photos and played to students using MM.
ii. Lots of thinking and lots of talking. Time is a huge factor to our progression or lack thereof. We are funding the sessions, great. Maybe we can organise a day to play next term.
iii. In school professional development on tools to contribute to ePortfolio, i.e., Web Cams, video, moviemaker, scanners etc.
iv. Thinking stage. Have heaps of photographs to document learning. Using Word to create booklets for classroom use/read.
v. Completed ePortfolios for preschoolers ready for parent teacher interviews for semester one, e.g., WAV files, photos, and simple movies of children in action, hyperlink to report card. Learnt today that I need to save report as PDF file.
vi. Students critiquing own work on paper. Made digital video and editing using Movie Maker with students. Format for digital portfolio being finalised.
vii. Getting teachers to learn new software and skills. Students developing pages in .ppt for use in their own ePortfolios.
viii. Slow but steady. Getting there.
ix. Still working on development.
x. One class is working well on Semester One work.
xi. Starting out. Would love to do profile on outside school hours care children.
xii. Year five children making own ePortfolio via scanning art and writing etc., web cam for oral presentations, digital photographs. Problems with various areas e.g., storage, microphones, documenting project via digital portfolio. Trying to! Don’t have XP.
xiii. No progress beyond exploration - yet!
xiv. Getting the hang of it. A long way to go!
xv. Moving along well.
xvi. Excellent considering where we started.

xvii. Slow, but time constraints.
xviii. Still learning. Haven't started. Intend to buy own cam at Dick Smith for use at home until I become proficient.
xix. Using Web pages with a general template.

27. Planning Committee Meeting of the ePortfolio Alliance (eA) (July, 2005)

a. Details

i. The meeting was held by teleconference on Thursday, July 7, 2005.
ii. T. Otto had difficulty locating a teleconference station in the district, and participants were advised to use the 'hands free' facility on their telephones or else hold the handpiece to their ear. N. Thorpe provided the telephone number for the teleconference which was billed to Toowoomba District Education Office.
iii. Participants:

T. Otto (Principal, Withcott State Primary School)
S. Denman (Teacher Librarian, Withcott State Primary School)
G. St Clair (Principal, Gatton State Primary School)
S. Fuller (Principal, Pilton State Primary School)
N. Thorpe (Principal Education Officer, Performance Measurement, Toowoomba)
M. Smith (Principal Education Officer, Performance Measurement, The Downs)
T. Angus (Co-ordinator, TTMSCE)

b. Meeting

i. In the emails associated with organising the meeting, S. Fuller forwarded an article he had found on ICT integration and ePortfolios, and the activity-reflection cycle in learning.
ii. Workshop 3 August: B. Butler to present his work at Crow's Nest P-10 School for the first hour, then a series of sessions on technical aspects such as burning to CD, using hyperlinks, file management, digital audio recording and editing, photo editing, writing to PDF.
iii. Workshop, Whole Day October 10: Face to face meeting to organise, suggestions include W. Smith's work at Crow's Nest P-10 School, how to use The Learning Place, Learning Objects, template design, legal implications, blogging, photo and audio editing.
iv. Committee members briefly commented on their progress e.g., Withcott School waiting on a server.
v. Information about the next session to be sent out on the discussion list, the email list to be reviewed to include teachers and school administrators new to the district. Information about the alliance to be included.
vi. Committee members agreed that teleconference mode was adequate for such a brief meeting (30 minutes).

28. ePortfolio Alliance and CLE/LCEF for 2006 and Beyond

a. Details

i. Actions were taken to sustain the operation of the network and secure funding from one year to the next. By the middle of 2005 the ePortfolio Alliance was well established and was recognised as a significant network by the two education district offices. The network was also recognised as a component of the TTMSCE, which had access to funds and resources including a co-ordinator.
ii. Now that the network was established, T. Otto sought to promote the theoretical framework of the project for application to other professional learning projects within the district and state, i.e., a Constructivist Learning Environment (CLE) as the instructional design of the project and the Learning Centred Evaluation Framework and activity theory to structure data collection and data analysis respectively.

b. Meeting of network representatives

i. In late 2004, Toowoomba and The Downs Education Districts went through different processes to allocate Learning and Development funding for 2005. The Toowoomba Education District allocated money to alliances (networks) managed by principals. The ePortfolio Alliance received $A17000 and the alliance was led by T. Otto as principal. The Downs Education District allocated human resources to address specific areas, and allocated T. Angus, a teacher attached to the TTMSCE, to support alliance activities for one day each week.
ii. In July, 2005, the Toowoomba and The Downs Education Districts came under the overall supervision of the Darling Downs-South West Regional Director.
iii. Representatives of alliances attended a meeting in July 2005 to report to the new Executive Directors of each district about the progress of networks and programs.
iv. The representatives were informed that Australian Government funding for learning and development programs was unknown, but likely to be reduced in 2006. While the work of

individual networks was appreciated, funding may only be available for Central Office initiatives.

v. The value of the ePortfolio Alliance was recognised as contributing: to the engagement of students in learning; to the processes of assessment and reporting; and to the engagement of teachers in meaningful professional development in ICTs.

vi. As a result of this meeting, a list was generated of networks and programs that would be supported within the two districts, and included the ePortfolio Alliance as a Curriculum Support Group. Principals were invited to comment on the list at a meeting in August 2005.

vii. T. Otto to Executive Directors Schools, Toowoomba and The Downs Districts (email): I am pleased to see that ePortfolios has been included as a Curriculum Support Group in the list of district networks. Unfortunately I cannot attend the meeting tomorrow, and will be unable to advocate on behalf of the alliance. The reason that I am writing to you is that the activities of the alliance are probably more familiar to teachers and associate administrators than principals, and those attending tomorrow may not be fully aware of what we have achieved. I would be happy to make myself available at another time to discuss with you the alliance, its aims, processes, and outcomes. In the next few weeks we are distributing a package of CDs to every school in Toowoomba and The Downs that represents a collection of resources and cases that we have developed. The significance of the group and what it has achieved should not be underestimated, and it would be a great loss to both districts if the work of so many people is not continued and supported. Attached is an evaluation summary of a Workshop we held yesterday, which certainly reflects the appreciation of teachers and the way in which activities are meeting their needs (see section 37).

viii. Executive Director Schools, The Downs District to T. Otto (email): Thanks for your feedback. I know of the valuable work that you and your alliance do and I know this is well recognised by [the Executive Director of Schools, Toowoomba District] and myself. Look forward to catching up with you soon.

ix. Executive Director Schools, Toowoomba District to T. Otto (email): I invite you, as a key member of either Toowoomba or The Downs Alliances/Working Parties, to be a member of the Toowoomba District Learning and Development Reference Group. We will meet on 19 August at District office to begin discussions about future directions in both L&D and Leadership Development. Please contact me to advise of your interest & availability. If you cannot make the meeting could you please advise a possible replacement. (This meeting was cancelled several times and finally took place in November 2005).

x. T. Otto to Executive Director of Schools, Toowoomba District (email): The focus of my research is on professional learning. ePortfolios just happen to be the topic. During the course of the study I have found that a Constructivist Learning Environment (CLE) (Jonassen) has met the needs of learners associated with the ePortfolio Alliance. Applying a recognised instructional design as a guide for professional development activities takes out the guess work. There is certainly nothing radical about the five elements of a CLE, which include: the issue; information resources; cases; tools; and social and contextual support. It is simply a way of making sure that all bases are covered. These elements also generate some very neat concepts running in the background such as cognitive flexibility and case based reasoning that are not overt but are none the less powerful processes. ICTs allow us to take this design one step further so it becomes a “Technology Enhanced Constructivist Learning Environment.” This design can be applied to a variety of learning situations for both adult professionals and children in classrooms. We need teachers to understand the construction of knowledge and how constructivist compatible theories of learning can be reflected in practice. What better way than to teach teachers as we would have them teach children. I wanted to catch up with you before Friday’s meeting to discuss this design. My research was initiated after attending a meeting early last year with a group of principals who were asked to suggest approaches to professional learning. While the ideas generated were all very reasonable and workable, no-one came up with an all encompassing model that was founded in research. It was just bits and pieces, and no doubt the end result would be bits and pieces. At the time I found it to be quite disturbing, that after 150 years of education in this state and with all the money and effort consumed on professional development, that this question had not been answered long ago. This raises the issue of organisational memory, which is also addressed in a CLE through the building of cases. At this stage of the research project I am particularly interested in the sustainability of both ePortfolios as the issue, and CLEs as an instructional design for professional learning. The TTMSCE appears to be taking on ePortfolios. It was getting too large for me to handle anyway. I now want to see how far I can take the CLE concept. Is it possible for the design to be supported for professional learning at the district level? Do you know anyone in Brisbane I could talk to as well? I am putting together a display of my research, the CD, and the achievements of the ePortfolio Alliance at the USQ Open Day on

Sunday, so a bit more exposure for the cause. Quite a number of students have expressed interest in the CD. (The Executive Director went on extended leave and no reply was received)

xi. N. Thorpe to T. Otto (email): I am working out at Chinchilla Office for the next few days and have been busy with meetings. By now you will know that the L&D meeting has been postponed to next term. I think your ideas re a constructivist learning environment are worth debating. They have worked very well in the technology focused environment of ePortfolios, as your network participant evaluations are indicating. I am wondering how they might apply to the Assessment and Reporting priority! I think that it may be best to call a meeting if you want face to face negotiation with other planning committee people.

xii. T. Otto to N. Thorpe (email): A learning environment is a learning environment is a learning environment. It doesn't matter if it's teaching maths or Eskimos how to build igloos. It fundamentally comes down to the same issue. Knowledge is built or constructed, there is the link to practice, and organisational memory is retained. This design has come from studies of how people learn, and I have noticed, too, that people tend to instinctively use the same elements. However, I want people to move beyond doing what they do because they feel instinctively that it is right, to doing what they do for a logical, defendable, and founded in theory reason. As I said before, a bits and pieces design will get you bits and pieces results. As Wayne Bennet says, if you keep on doing what you've always done, you'll keep on getting what you always got. The advantages of working to the one design across the board are that you are making sure that all bases are covered and people know what to expect. On the other hand, I have no idea what to expect for the next bit of syllabus inservice we are likely to get. It really has nothing to do with technology, CD-ROMs, or for that matter anything physical, though you can use these things to support the environment. It is about something that you carry around in your head. If you want to learn something, use these five elements as a mental model or guide. You don't even need a piece of paper. Sorry, but I am weary to the bone. Putting together the CD was a huge job, though Tania did some great work to get it started. I am trying to run a school at the same time. We had a great result on the student free day on Tuesday bringing the staff up to speed on ICTs, but it took quite a lot to put together also. The USQ display came up and it was too good an opportunity to miss. We are now into our 5th week of installing the new curriculum server (hopeless, hopeless, hopeless), and poor Sharon Denman has been driven insane.

a. Additional funding
   i. In August 2005, N. Thorpe arranged for Learning Place funding of $A5900 to be transferred to Withcott State School to manage. The funds were intended for Learning Objects workshops, but may also support activities of the ePortfolio Alliance.

b. USQ Open Day
   i. In September, 2005, T. Otto prepared a display of the project for the USQ Open Day. Posters describing the theoretical framework and activities of the network were prepared on A3 card and laminated and arranged on a display board.
   ii. The same posters were displayed at the staff development day in October.

29. After-School Workshop (August, 2005)

a. Details
   i. Wednesday 3 August 2005, at the TTMSCE, Toowoomba State High School, Wilsonton, 4.00 to 6.00 p.m.
   ii. An information and nomination sheet was emailed to participants registered on the distribution list. This sheet was also emailed to all principals in Toowoomba and The Downs Districts. Nominations were returned by email or fax. The session was attended by 80 teachers, with the wider distribution of the email attracting several new participants. A teacher from Warwick (80 km away) telephoned to say he would not be able to attend because of ill health but was very keen to obtain a copy of the audio CD. He requested that his name be registered for the October session.
   iii. A video recording of the first session and the PowerPoint presentation was included in the CD package to be distributed to all schools across the two districts.

b. Sessions
   i. The whole group session was introduced by T. Otto. An information sheet developed by T. Angus was distributed to explain common technical tasks such as creating hyperlinks, burning to CD, and attending to copyright issues. T. Angus spoke about The Learning Place and distributed material. B. Dittman advertised the Science conference to be held on the October 10 Student Free Day, and invited the ePortfolio Alliance to organise presenters and join in on the day.
   ii. B. Butler, a teacher from Crow's Nest P-10, gave a 45 minute presentation to the whole group on building ePortfolios with FrontPage (see photo below). He has been working on ePortfolios

with primary and secondary children since the inaugural meeting of the network in March 2004. He has used his considerable skills to integrate ICTs into every aspect of his teaching, and has created valuable resources and generously shares what he has developed.

iii. Participants moved to three computer rooms for a one hour 'hands-on' session. B. Butler's group created ePortfolio templates using FrontPage. C. Lapworth introduced Irfanview, a free download to batch process images, e.g., rename or resize. This simple but useful program was included in the package of CDs for distribution. J. Dowling, a music teacher who services Withcott and a circuit of small schools presented free download programs to manage audio productions for inclusion in ePortfolios. He also prepared a CD for inclusion with the package of CDs for distribution.
iv. Participants were asked to evaluate the session on the sheet provided.

c. Comments by Participants: Whole Group with B. Butler
   i. Answered a lot of our questions. Reassured us that we were travelling in the right direction.
   ii. Good.
   iii. Very useful. Some points to ponder.
   iv. Great presentation. Maybe a little fast.
   v. The CD will be great to have. Thanks. Good presentation.
   vi. Expected more.
   vii. Help. We need to set up these folios for our early years folios.
   viii. Very good and interesting.
   ix. Informative.
   x. Interesting to provide options on how to set up ePortfolios.
   xi. Very good at providing resources and ideas and examples for types of ePortfolios possible.
   xii. Brett has reinforced the fact that with IT the sky is the limit.
   xiii. Good to see what others are doing with ePortfolios.
   xiv. Very good. Covers the basics.
   xv. Useful for someone starting out.
   xvi. Wonderful! Didn't assume lots of prior knowledge.
   xvii. It is starting to make more sense. I have built on from the last meeting. Thanks Brett.
   xviii. Really enjoyed it. Very down to earth. Realistic. Well paced.
   xix. Am keen to try now as the explanation (hiccups aside) was helpful to me. A trier!
   xx. Informative.
   xxi. Really knew his stuff. A little slow paced.
   xxii. Enjoyed presentation and the use of FrontPage for ePortfolios..
   xxiii. Basic information. Could be shared at school level.
   xxiv. As always, very useful. I got the impression that Brett needed more time.
   xxv. Good. Interesting to see a finished folio.
   xxvi. OK. Just revisited what I knew.
   xxvii. Great to see all the background work Brett did, i.e., burn copies. More time needed for slower learners. Maybe two workshops next time.

d. Comments by Participants: Building ePortfolios in FrontPage
   i. Can Brett come to [school] and work with early years teachers setting up folios from prep to year one.
   ii. Great, practical ideas.
   iii. Very informative and enjoyable.
   iv. Very interesting. Increasing my understanding of computer programs. Saves a lot of time learning on our own. Thank you.
   v. Extremely good value for using FrontPage as method of ePortfolios. Great idea the CD with template and resources. Thanks!
   vi. I use PowerPoint and this is a new medium. Thanks Brett!!
   vii. Very useful template. Easy to follow the template. Useful tool to use at school.

viii. Great to see someone who is prepared to share and this was good hands-on for beginners. Better preparation for the circumstances of the lab would have been good.
ix. Good.
x. Want to know more. A great start!
xi. Thanks Brett. You did a good job. I found it easy to follow.
xii. Fairly basic. Perhaps a follow up.
xiii. Didn't get through as much as hoped, but what we did was good.
xiv. Some useful information.

e. Comments by Participants: Photo Processing with Irfanview
i. Very useful session. Learned a great deal re photo resizing which can be used for other programs.
ii. Learnt about the programs. Will use back at school and at home.
iii. Fabulous. What a great thing to learn! Thanks Cameron.
iv. Excellent presentation. Thank you.
v. Fantastic.
vi. Good. Thanks. I use Irfanview with a school web site, but didn't know about batch conversion. That will save time.
vii. Good. We just needed longer to play around with the techniques.
viii. Nice to see that you were well prepared and explained and showed batch conversions. Thank you.

f. Comments by Participants: Audio
i. Answered lots of edit and copyright questions. Needed more time. Can't wait for disc to explore more.
ii. Really excellent.
iii. Very well presented. Lots of great tips.
iv. Excellent!! Some great stuff. Looking forward to experimenting myself.
v. Very helpful.
vi. Jim knows his stuff, but speaks very fast. He is very helpful and most generous with his sharing.
vii. Thanks for another great session. Great? Really practical ideas on "how to." Jim is very enthusiastic. Thanks for thinking of putting together the CD for us.
viii. Great resource collection.
ix. So much info. Can't wait for the CD with all the stuff on it so I can try some. Terrific

g. Ratings

Table D.6: Workshop Evaluation Summary (August, 2005)

Sessions	Usefulness					Total	Mean
	1	2	3	4	5		
Whole Group with B. Butler			5	19	15	39	4.3
Building ePortfolios in FrontPage			6	7	9	22	4.1
Photo Processing with Irfanview				1	8	9	4.9
Audio				3	7	10	4.7

30. Planning Committee Meeting (August, 2005)

a. Details
i. A meeting of the Planning Committee was held on Wednesday 24 August 2005 at district office to arrange the Staff Development Day on the Student Free Day on October 10, 2005.
ii. Members were shown the CD-ROM for distribution.

31. Whole Day Workshop (October, 2005)

a. Details
i. ePortfolios formed a stream of sessions at the Science and Technology Forum organised by the TTMSCE at the Toowoomba State High School, Mt Lofty Campus. Online registration and meals were organised by the TTMSCE.

b. Sessions
i. T. Otto gave two presentations with 24 & 29 participants on the booklet *ePortfolios: A learning tool.* Teachers from schools funded by the alliance presented examples of children's work and spoke about what they were doing, including S. Denman, & T. Dempsey from Withcott State School; T. Mancktelow, R. Duck, & D. Klease from Wilsonton State School; and L. Brosnan from Glenvale State School.
ii. B. Butler from Crow's Nest State School gave two presentations with 30 & 16 participants on Creating ePortfolio Templates in FrontPage.

iii. A. Smith from Toowoomba State High Wilsonton Campus gave two presentations with 30 & 15 participants on Microsoft Producer.
iv. S. Fuller from Pilton State School gave two presentations with 30 & 11 participants on Photo Story 3.
v. J. Dowling, Music Teacher from Withcott State School gave one presentation with 6 participants on Working with Audio.
vi. A. Smith from Toowoomba State High Wilsonton Campus gave one presentation with 10 participants on Still Image Processing.
vii. Three teachers from Withcott State School presented a session on their technology projects.
viii. After the conference, T. Angus proposed the idea of an "ePortfolio playground" to be established in 2006 where teachers can bring along partially completed work and be assisted by peers and experts. It would be a scaffolding process that lies between "making a start" and "a confident practitioner." By advertising the proposal before the end of 2005, teachers and school administrators would know where the alliance was heading in 2006.
ix. Feedback forms were received from 60 out of 185 people attending the forum.

c. Comments by Participants: The Pedagogy of ePortfolios and Sharing Stories
   i. Very valuable handouts, great presentation.
   ii. Great to see examples.
   iii. Excellent practical ideas.
   iv. Very interesting
   v. Practical examples, theory was not over 'jargonised.'
   vi. Detailed theory behind ePortfolios & how to begin using them. Can't wait to try!
   vii. Great review.
   viii. Good to see real examples!
   ix. Interesting.
   x. Will definitely use this!
   xi. Great to see different methods.
   xii. Very worthwhile & good examples. Great input from classroom teachers.

d. Comments by Participants: Creating ePortfolio Templates in FrontPage
   i. Has potential!
   ii. Not enough time!
   iii. Excellent-hands-on!
   iv. Lots of great possibilities for storing student's work, refresher course in FrontPage.
   v. Useful sometimes.
   vi. Easily understood and could answer questions.
   vii. Very good, more time, another session perhaps.
   viii. Moving along.
   ix. Down to earth-not threatening-real practising teacher 'doing'.
   x. Very good.
   xi. Practical and has inspired me to try ePortfolios in my classroom.
   xii. Would need more access to latest technology to use. Good idea. Would like to see implemented in the future.
   xiii. Good follow-on from ePortfolio Alliance workshops. Thanks!
   xiv. Information was great. Time was a problem-not enough!
   xv. Excellent.
   xvi. Will definitely use this!

e. Comments by Participants: Microsoft Producer
   i. Great to have an appreciation of the various programs that can be used for ePortfolios as well as for other purposes.
   ii. More IT PD needed.
   iii. Presenter had not enough time and no videos to add to presentation.
   iv. Unfortunately not have enough time.
   v. Too much to fit in the time. A video clip for us to work on would have been good.
   vi. Not likely to use this in middle (year 4) classroom, too time consuming.
   vii. Very good although more time was required.
   viii. Too confusing.

f. Comments by Participants: Photo Story 3
   i. Great presentation, I feel confident in tackling the program.
   ii. Fantastic! Great to see, hands-on as well as play. Learned heaps, thank you.
   iii. Thoroughly enjoyed and very easy to understand.
   iv. Handout appreciated.
   v. Great! Lots of positive avenues it could be used for.
   vi. Excellent presentation.

vii. Excellent, practical, usable.
viii. Excellent. Student centred. Practical, too. Need technological hardware to use.
ix. Awesome! Love this program. Much easier than moviemaker.
x. Will use this in our school instead of Movie Maker. Well presented, very informative.
xi. Great!
xii. Excellent. I would use this tomorrow although my school has Apple machines.

g. Comments by Participants: Working with Audio
   i. Great!

h. Comments by Participants: Still Image Processing
   i. Went too fast & tried to cover too much content. I became lost and stayed lost.
   ii. I've used Photo Shop before & found Paint Shop confusing.
   iii. Too rushed and not everything went as planned.

i. Ratings

Table D.7: Workshop Evaluation Summary (October, 2005)

Sessions	Usefulness					Total	Mean
	1	2	3	4	5		
The pedagogy of ePortfolios and sharing stories		1	4	10	7	22	4
Creating ePortfolio templates in FrontPage			3	9	10	22	4.3
Microsoft Producer		2	5	2	3	12	3.5
Photo Story 3					15	15	5
Working with Audi				1		1	4
Still Image Processing		3		1	1	5	3

31. Summary of Funding and Expenditure for 2004 & 2005

a. Details
   i. The table below is a summary of the funding made available for networking activities and how those funds were expended.

b. Content
   i. In November, 2005, C. Zilm advised that the TTMSCE had allocated $A2000 out of its budget for the ePortfolio Alliance for the first six months of 2006.
   ii. Funds available for 2006 were $A6170, though some of this money may need to be spent on Learning Objects workshops.

Table D.8: Funding Distribution

Funding			
August 2004	TTMSCE	The TTMSCE allocated funds from its budget to support Digital Portfolio Network activities	2000
February 2005	Education Qld Toowoomba District	Funds provided from a submission for Learning & Development funds for the ePortfolio Alliance $A14700 Strategic Curriculum Support $A2300 Aust Government Quality Teaching Program	17000
September 2005	Education Qld Toowoomba District	Funds to be spent on Learning Objects was transferred to Withcott SS and some of the funds could be expended on ePortfolios	5700
January 2006	TTMSCE	The TTMSCE allocated funds from its budget to support ePortfolio Alliance activities	2000
		TOTAL	26700
Expenditure			
2004/2005	Stationery	Photocopying for Workshops and production of the CD-ROM	750
2004/2005	Catering	Workshops	1006
2004	Presenter costs	One presenter reimbursed for expenses relating to a Workshop	346
December 2004	Conference registration	T. Otto to attend the ePortfolio Australia Conference, Melbourne	318
March 2005	TRS	To release teachers to develop ePortfolio frameworks	16200
September 2005	Learning Objects	To release teachers to attend Learning Objects workshops	1910
		TOTAL	20530

32. Planning Committee Meeting (February, 2006)

a. Details
   i. Wednesday 15 February, 2006 at Toowoomba District Office.
   ii. Participants:
      T. Otto (Principal, Withcott State Primary School)
      T. Mancktelow (Deputy Principal, Wilsonton State Primary School)
      T. Angus (Co-ordinator, TTMSCE)
      M. Smith (Principal Advisor Education Service, Toowoomba District)
      N. Thorpe (Principal Advisor Education Service, The Downs District)
   iii. M. Smith and N. Thorpe have new titles and districts in 2006 after a reorganisation of district support services.

b. Discussion
   i. Staff Development Days for Semester one 2006 were discussed and arranged.
   ii. An introductory session to be held on Wednesday 15 March, to follow the established pattern of a whole group presentation then break into three workshops: basic equipment; Photo Story 3; and Building ePortfolios with PowerPoint. Limit to 90 participants.
   iii. Four ePortfolio Playground sessions to be arranged on 8 March, 22 March, 3 May, 17 May. Teachers bring projects to work on with the support of peers and experts. Limit to 30 participants.
   iv. T. Otto to prepare flyers for N. Thorpe to email.
   v. $A2000 in funding allocated by the TTMSCE.
   vi. Sessions on ePortfolios to be arranged for the whole day at the Science and Technology Forum, 10 July, Toowoomba State High School.
   vii. T. Otto may be asked to be involved in the “Road Show” to deliver professional learning to schools in the isolated western areas of the region.

c. Later Discussion
   i. A meeting was held on Wednesday 1 March at Toowoomba State High School (Wilsonton Campus) to make final arrangements with the session presenters.
   ii. Participants
      T. Otto (Principal, Withcott State Primary School)
      T. Angus (Co-ordinator, TTMSCE)
      C. Lapworth (ICT Co-ordinator, Toowoomba State High School, Wilsonton Campus)
      A. Smith (ICT Co-ordinator, Toowoomba State High School, Wilsonton Campus)
   iii. Participants in the ePortfolio playground to use a memory stick to bring, save, and take away projects.
   iv. Creation of a home folder to store projects was demonstrated.
   v. Format for Introductory session to be whole group presentation, demonstration of basic equipment (scanner, digital camera and video, web cam, data projector), two workshop groups for Photo Story and PowerPoint/Inspiration.
   vi. Proposed that the next session includes workshops on Audacity, Inspiration, and Producer.
   vii. The two ICT Co-ordinators had supported the alliance for two years by presenting workshops. They rearranged their schedules to be available for the workshops in 2006.
   viii. Both ICT Co-ordinators commented that the ePortfolio Alliance delivered the only consistent and sustained professional development events that they attended during 2005. They also commented that the children in their classes were better prepared to use ICTs because teachers are more confident in using ICTs as a result of ePortfolio Alliance activities. They were very pleased to be associated with the project.

33. All-in-One Sessions on ePortfolios

a. Details
   i. As the activities of the ePortfolio Project became known across the region, T. Otto was called upon to give presentations to introduce ePortfolios at school staff meetings, district meetings, to student teachers at the local university and at regional and state sponsored professional development events.
   ii. The software associated with ePortfolios was loaded on to a laptop for demonstration, including FrontPage, PowerPoint, Word, Access, Excel, Adobe Acrobat Reader/Writer, IrfanView (Image Editing), Paint, Movie Maker (Video Editing), Audacity (Audio Editing), Photo Story 3, and Inspiration. Hyperlinks and file management were also demonstrated.
   iii. The hardware associated with ePortfolios was purchased and assembled in bags that could be readily packed and unpacked. The bags contained a data projector and power cords, digital movie camera, digital camera digital SLR, web cam, digital voice recorder, external hard drive, an example of a DVD with a label printed in colour, an external DVD burner, external video grabber, pen tablet, and scanner.

iv. Equipment was funded by the projects in which T. Otto was involved, e.g., the ICT Pedagogy Framework project. The project facilitators would allocate one day of teacher release funding for each day he was away from the school. However, being a non-teaching principal he did not need to spend the funding on a teacher replacement, and instead used the money to purchase ICTs for the all-in-one sessions and for Withcott State School.
v. The Withcott State School also benefited financially in that the Regional Technology Manager deposited ICT related project funds into the school account for distribution. In 2007, the amount was approximately $A150 000, and the interest was kept by the school.
vi. Withcott State School is a very stable school, and senior teachers capably took charge during the principal's absences.

b. Instructional Design
i. The instructional design of the all-in-one sessions was based on the five elements of a constructivist learning environment.
ii. The issue: Outline the concept and purpose of ePortfolios
iii. Information Resources: Distribute the booklet *ePortfolios: A learning tool*
iv. Cases: Demonstrate a teacher centred and student centred ePortfolio
v. Tools: Demonstrate the requisite hardware and software
vi. Social and Contextual Support: Provide advice about how to access support

c. Content
i. Below is copy of the PowerPoint presented at the all-in-one sessions (read from left to right)

Table D.9: All-in-one Session Presentation

 **ePortfolios: A learning tool** **Dr Tom Otto** Principal Withcott State School tom.otto@eq.edu.au 	An ePortfolio is a <u>purposeful</u> <u>collection</u> of work, captured by <u>electronic</u> means, that serves as an <u>exhibit</u> of <u>individual</u> <u>efforts</u>, <u>progress</u>, and <u>achievements</u> in one or more <u>areas</u> 1. Derived from paper based portfolios 2. Information in digital format can be presented as multi-media	**Types of ePortfolios** 1. Summative 2. Formative 3. Marketing ePortfolios are a mirror, a map, and a sonnet (Helen Barrett)
Advantages of ePortfolios 1. Meaningful application of ICTs 2. Develops ICT skills 3. Assessment and reporting 4. Rich picture of student ability 5. Growth of learning over time 6. Multiple intelligences 7. Information literacy 8. Future roles in society 9. Life long learning	**Views of Knowledge** Continuum 1. Traditional transmission instruction 2. Constructivism ePortfolios are also on a continuum 1. Teacher centred - positivist or summative 2. Student centred - constructivist or formative	**Getting the best from ePortfolios** 1. Learner ownership and engagement - Emotional connection - Done <u>by</u> the student, not <u>to</u> the student 2. Children need to learn how to be reflective 3. Understand deep learning 4. ePortfolios should <u>tell a story</u> of individual student learning. It is the story of knowing: knowing about things; knowing oneself; and knowing an audience.
Skills 1. A 2-3 year journey to gain self-efficacy 2. Trial and error 3. A solution for every problem 4. Others have similar problems 5. "Google" solutions e.g. enter error messages, type of problem experienced	**Software** 1. FrontPage or PowerPoint 2. Word, Access, Excel 3. Adobe Acrobat Reader/Writer 4. Hyperlinks & File Management 5. Image Editing - IrfanView 6. Video Editing - Movie Maker 7. Audio Editing - Audacity 8. Photo Story 3 9. Inspiration	**Hardware** 1. Recordable CD-ROM/DVD 2. Scanner 3. Digital camera 4. Digital movie camera 5. Web cam 6. Digital (MP3) audio recorder 7. Pen tablet 8. Printer
Issues 1. Protection and privacy 2. Censorship 3. Lamination (becomes an exhibition) 4. Heavy lifting (worth the extra effort) 5. Trivialization (not worth reflecting on) 6. Perversion (becomes objective) 7. Misrepresentation (isolated examples)	**Content of ePortfolios** 1. Products and Processes 2. Students' perceptions of their learning 1. Table of contents 2. Tasks 3. Student reflections 4. Links to areas of assessment 5. Purpose/Goals 6. Artefacts 7. Standards (good/not-so-good) 8. Judgments	**Features of Authentic Assessment** 1. Meaningful tasks 2. Multiple assessments 3. Quality products 4. Higher-order thinking 5. Positive interaction 6. Clear tasks and standards 7. Self-reflections 8. Transfer into life 9. Ongoing or informative 10. Integration of knowledge

Advice	**ePortfolio Alliance**	A journey of 1000 miles begins with a single step.
1. Start small 2. Action plan Vision Assess skills of teacher and children Skill development Resources Incentives Innovators and early adopters	1. "Grassroots" interest 2. Potential to change the way we go about the task of teaching 3. Change the way teachers and children interact	In the world of ePortfolios, that single step is a student saving a favourite story on a disk.

d. Whole Day Workshop, Chinchilla SHS, March, 2006
   i. The principal of Chinchilla State High School telephoned T. Otto to arrange a day of professional development on ePortfolio frameworks.
   ii. While T. Otto had previously given many presentations to introduce the concept of ePortfolios, it was this visit to Chinchilla where the concept of an all-in-one session began to develop.
   iii. T. Otto (Researcher), C. Lapworth (Art teacher Toowoomba State High School Wilsonton Campus), and C. Marendy (Regional Technology Manager) travelled to Chinchilla, 160 km west of Toowoomba, on Monday 20 March, 2006.
   iv. Three 90 minute sessions were held during the day in a computer laboratory with groups of teachers (Arts and Health & Physical Education; Special Needs; and English, Maths, Science, and Technology). Examples of ePortfolios were presented using the data projector. Webcams, digital cameras, digital video cameras, scanners, and data storage devices were discussed and demonstrated. Participants created an outline in Word as a template for a PowerPoint ePortfolio, and inserted links to the pages and artefacts.
   v. A whole of staff session was conducted from 3.00 p.m. to 5.00 p.m. with 38 teachers. Six local primary teachers and a Principal Education Officer (Performance Measurement) from the Chinchilla District Education Office also attended. T. Otto presented examples of ePortfolios using the data projector and then gave a PowerPoint presentation on key points in the booklet *ePortfolios: A learning tool* (see appendix E.3). C. Lapworth demonstrated outlines in Word and hyperlinking in PowerPoint. This was to be conducted in a laboratory as a workshop, but time became limited. C. Marendy spoke about proposed improvements to technical support services and project rooms in The Learning Place, including the project room he had created to provide information to the region.
   vi. Issues and Reflections: While there was no formal process for feedback, comments by participants throughout the day were noted. The Head of Department (Technology) was involved in upgrading the server, which limited time available to support staff in learning how to use equipment. Equipment failures and technical support were seen as barriers to the implementation of ePortfolios. Teachers had submitted year 12 work in digital format to panels of the Queensland Studies Authority responsible for assessment moderation. The panels, though, were reluctant to accept work in digital format. It was concluded this was because panels did not have access to equipment and software appropriate to view student work, and there was a perception by panels that paper submissions were more reliable, e.g., teachers have submitted student work as projects rather than as rendered videos and could not be viewed. Several teachers commented that presentations such as this one by practicing teachers and school administrators were more useful than presentations by "experts" who did not have recent classroom experience.

e. University of Southern Queensland, April, 2006
   i. T. Otto was invited by the USQ Faculty of Education to present a 60 minute session on ePortfolios to final year education students. The same session was presented three times with 30 participants at each session.

f. Preparatory Year Teachers, June, 2006
   i. T. Otto was invited by Marg Smith to present a 60 minute session on ePortfolios to teachers who were planning to become preparatory teachers the following year.
   ii. ePortfolios were being recommended by Education Queensland as the preferred process for reporting the progress of preparatory year children to their parents.

g. Darling Downs-South West Region ICT Road Shows
   i. The Regional Technology Manager invited T. Otto to present all-in-one sessions on ePortfolios at a series of professional development days being offered to rural and remote schools to support the classroom implementation of ICTs.
   ii. The project received federal government funding of $A55700 for the Darling Downs-South West Education Region. This money paid for teachers and teaching principals to be released

from classroom duties and for the accommodation and travel expenses of presenters and participants.

iii. Two-day workshops were conducted between April and August 2006 at Chinchilla, Warwick, Stanthorpe, Toowoomba, Dalby, Roma, and Charleville.
iv. As an experienced school administrator, T. Otto was also asked to present sessions on principalship in small schools.
v. Participant Response - I am interested in introducing ePortfolios into the School of Distance Education starting with the lower years. I attended your workshop at the Principals' conference in Charleville last year. I would be interested in obtaining the training CD and any other materials you have that are available.
vi. Participant Response - I attended the ICT Road Show in Chinchilla and attended your session on ePortfolios, to which might I add was a real blast. I enjoyed this session immensely and shared what I had seen with the staff at [State Primary School]. Some staff members then attended another information session with another organization in Toowoomba and came back with, what I feel, were wrong ideas and misconceptions about ePortfolios. Seeing is a lot easier for some, so I am wondering would you be able to come to [State Primary School] and present your session to our staff so they can see it's not as hard as they think it is.

h. Tara, August, 2006
   i. T. Otto was invited to visit Tara and present an all-in-one session to 50 teachers and school administrators from the Tara District College and the cluster of primary schools in the area.
   ii. T. Angus, Learning Place Co-ordinator also attended the meeting and gave a presentation on The Learning Place. T. Angus became Head of Curriculum at Withcott State School in 2007.

i. Harristown SHS, September, 2006
   i. C. Marendy, Regional Technology Manager, invited T. Otto to present an all-in-one session at Harristown State High School as part of a professional development project that he had arranged.

j. Principals, March, 2007
   i. An education officer from Central Office had been involved in the road shows described in section g. During the road shows he observed T. Otto conducting all-in-one sessions.
   ii. As a consequence of his observations, this officer arranged for 55 principals from across the state to visit Withcott in three groups for an all-in-one session.

34. ePortfolio Playground

a. Details
   i. In 2006, ePortfolio Playground sessions were arranged for 8 March, 15 March, 3 May, and 17 May in the computer laboratories, Toowoomba State High School Wilsonton Campus, 4.00 p.m. to 6.00 p.m.
   ii. The first session was attended by 15 teachers. 13 of those teachers had attended several after school workshops, and the other two were to attend the introductory session the following week.

b. Sessions
   i. T. Otto introduced the session and spoke about some of the latest technology including external hard drives, digital cameras, digital SLR cameras, external DVD burners, and the differences between CD and DVD for data storage. The introduction of a set of resources for each teacher at Withcott was discussed, including new computers, data projectors, web cams, and scanners.
   ii. C. Lapworth demonstrated an interactive whiteboard.
   iii. Participants broke into two groups for 20 minutes for a demonstration of web cams and Photo Story 3.
   iv. Participants worked on their projects on the networked computers.

c. Evaluation
   i. T. Otto observed participants during the session rather than distributing an evaluation sheet.
   ii. The time that participants had for working on their projects was still limited, because of the introductory section and by the time projects were loaded on to computers and they became familiar with the computer setups. The USB flash drives did not work on all machines, which wasted further time. It was preferable that participants start on their projects from the beginning of the next session. In a mixed group, information is new to some and common place to others. The introductory session still served a purpose, and generated questions and interest.
   iii. A participant had difficulty with the concept of the final process in editing video, i.e., rendering the project to a format that can be viewed on a media player. She had created 20 or more projects the previous year, but had not rendered any. Meanwhile the original video clips had been moved to other folders and she could not retrieve the projects. The Head of

Department of a high school recounted the same problem occurring when a teacher submitted an ePortfolio of 12 year work as a project rather than as a rendered video clip, and consequently the markers could not view the work.

35. Introductory After-School Workshop (March, 2006)

a. Details
   i. Wednesday 15 March, 2006, at the Toowoomba State High School, Wilsonton Campus Library and computer laboratories, 4.00 to 6.00 p.m.
   ii. An information and nomination sheet was emailed to al schools in Toowoomba and The Downs Education Districts. Nominations were returned by email or fax. The session was attended by 52 teachers. A groups of teachers travelled from Millmerran (80 km away).
b. Sessions
   i. The booklet and CD-ROM *ePortfolios: A learning tool* were distributed. T. Otto spoke for 30 minutes about ePortfolios supported by a PowerPoint presentation. Two cases of ePortfolios developed at Withcott State Primary School were demonstrated.
   ii. Commonly used hardware were displayed and discussed.
   iii. T. Angus spoke about The Learning Place.
   iv. C. Lapworth conducted a workshop in the computer laboratory on developing an ePortfolio in PowerPoint. Participants created a template.
   v. A. Smith conducted a workshop on Photo Story.
c. Evaluation
   i. The format for this session was slightly different from the sessions the previous year. There was too much information too soon, and the cases from Withcott should have been presented at the beginning of the session so that participants could see an ePortfolio before the presentation about ePortfolios.
   ii. Presenters worked at a pace that reflected the limited skill levels of participants.

36. Education Queensland Showcase (June, 2006)

a. Details
   i. Education Queensland invites project managers each year to submit a report on their activities to compete for an award of $A1000 at the regional level and $A20 000 at the state level.
b. Content
   i. T. Otto submitted a report in 2006 on the activities of the ePortfolio Alliance and was successful at the regional level but was unsuccessful at the state level.
   ii. The award was an opportunity to promote the alliance and activities could be advertised as a Showcase Award winning project.

37. Education Queensland ICT Pedagogy Framework

a. Details
   i. In 2006, T. Otto, a deputy principal and two teachers from the Darling Downs-South West Education Region were trained as accredited presenters for the state-wide implementation of the Education Queensland ICT Pedagogy Framework (see Table D.1).
   ii. The training provided an opportunity to compare the work of the ePortfolio Alliance with professional development provided by the education system and to evaluate the application of the concept of ePortfolios in the state-wide framework.
   iii. T. Otto conducted workshops as a facilitator during 2006, 2007, and 2008, with each annual workshop involving up to 50 teachers. He also moderated (assessed approximately ten teacher portfolios each year.
b. Content
   i. Four presenters from each of the 12 regions in the state were trained for two days during March 2006. The four presenters then trained 48 teachers in their region.
   ii. The presenters were trained in the same way that they were expected to train teacher participants.
   iii. Presenters were provided with $A3000 in funding so they could be released from teaching duties for eight days. T. Otto did not require release because he was a principal and used the money to purchase a laptop, software, and a kit of ICT equipment for demonstrating the resources required to develop ePortfolios (see section 33).
   iv. Teacher participants also received funds so they could be released from classroom duties, but their schools were also required to contribute funds.
   v. An online course to support presenters and participants was provided at The Learning Place and developed using the Blackboard Academic Suite. The course included announcements, information about the trial, course content, portfolios, resources, ICT planner, blogs, tools, e.g., to create a homepage, web links, contacts, and frequently asked questions.

vi. Participants were required to develop a professional ePortfolio that addressed the framework described in Table 2.27.
vii. The ePortfolios were created in PowerPoint and included sections on the teacher's context and philosophy about the use of ICTs in the classroom, evidence of a major and two minor classrooms ICT projects they had undertaken recently, and evidence of their collaboration with other teachers.
viii. An example of a teacher's portfolio is included as a case element in appendix F.11.C.
ix. Presenters from each region designed their training program using elements from their own training. In the Darling Downs-South West Region, the 48 teachers met as a whole group for two days to participate in the activities listed in Table D.2. The preparation and presentation of activities was shared among the four presenters. For the third day of training, a presenter travelled to Chinchilla, another presenter travelled to Warwick, and two presenters worked with participants in Toowoomba.
x. T. Otto presented similar sessions to those presented at ePortfolio workshops. Participants reported that the five elements of a constructivist learning environment were useful in structuring an ICT project.
xi. The teachers were expected to maintain contact with each other and the presenters through blogs facilitated by The Learning Place.
xii. The completed ePortfolios were assessed by at least two presenters and the teachers received a *Pedagogical Licence* if the presenters believed they had met a sufficient standard.

Table D.10: Darling Downs-South West Education Region Training Program

Day One: 26 April	Day Two: 3 May 2006
1. Welcome and Overview	1. Six Thinking Hats retrieval
2. Goal Setting Response Sheet	2. Overview of Module Two
3. Café to Go (group responses)	3. Feedback from Module One
4. Teaching Through the Ages	4. Views of Knowledge
5. What a good ICT class looks like	5. What do the statements in the ICT Pedagogical Licence mean with examples
6. Galley Walk	6. Explore Exemplars
7. Explore the Pedagogy Framework	7. Create Action Learning Sets
8. Portfolios explained	8. Explore ICT areas of interest
9. Teaching with ICTs	9. Create PowerPoint presentation from an outline in Word
10. Action Learning	10. IrfanView, Screen Captures, Hyperlinks
11. ePortfolios	11. Child's ePortfolio
12. Initial Portfolio Planning	12. Del.ic.ious
13. Connected Learning	13. Compressing files
14. Project Rooms	14. Requests from participants
15. Project Room Activity	15. Online Activity Plan
16. Blog Entry	16. Plan learning activity facilitated by ICT
17. Homework	17. Personal Review of Learning Activity Plan
18. Module Two Explained	18. Chat Room
	19. Blog Entry and Response

c. Evaluation
i. The central co-ordinator provided these comments on the state-wide project to implement the ICT Pedagogy Framework.
ii. The information pack calling for participants did not sufficiently explain what would be involved in the project. Some teachers nominated and attended the first session before they realized they did not have sufficient experience in the classroom implementation of ICTs to be able to report on a major and two minor projects in their ePortfolios.
iii. Timelines were too short for those teachers who had to undertake projects that they could report in their ePortfolios.
iv. The Regional application process worked well but communication and management proved to be complicated as the funding was provided centrally but the program was managed locally.
v. Teachers valued: the process of reflecting on their beliefs and practices; networking with peers; engaging in professional conversations; formal recognition for what they do; and gaining a deeper understanding of the expectation for how ICT is used most effectively in teaching, learning and the curriculum.
vi. The evaluation process needed opportunities for moderation of the professional ePortfolios across regions for greater consistency across the state.
vii. Delays were experienced in providing feedback to participants.

38. Whole Day Workshop (October, 2006)

a. Details
   i. Four 90 minute sessions on ePortfolios were presented on Monday 23 October 2006 at the Science and Technology Forum at the Toowoomba State High School, Mt Lofty Campus.
   ii. Online registration and meals were organised by the TTMSCE.
   iii. Schools did not have to pay for the release of teachers because this was a student free day.
b. Sessions
   i. T. Otto presented an introductory session for 18 participants (see section 35).
   ii. T. Otto co-ordinated a session for 17 participants. S. Denman and T. Dempsey from Withcott State School and R. Duck and H. Thompson from Wilsonton State School presented examples of children's work and spoke about their classroom implementation of ePortfolios.
   iii. A. Smith from Toowoomba State High Wilsonton Campus presented a session on Microsoft Producer.
   iv. C. Lapworth from Toowoomba State High Wilsonton Campus presented a session on free software to use with ePortfolios..
c. Observations
   i. These observations of the second session were recorded by T. Otto.
   ii. The four teacher presenters spoke with confidence about their work. Each made reference to the benefit they had gained from participating in the ePortfolio workshops. They also told their personal journey of perseverance in learning about ICTs and ePortfolios over several years. Their presentations reflected the various ways they had solved problems associated with implementing ePortfolios. For example, one teacher had her children draw four numbers out of a hat as a way of sharing access to four computers.
   iii. Participants were focused on the presenters throughout the session and several made positive comments on leaving the room.
d. Participant Comments: Introductory Session
   i. Considering I didn't know what an ePortfolio was, I learnt a great deal about their uses and equipment to aid in their creation.
   ii. It was really a good session but I'm doing a Technology major at uni at the moment so I had covered most of this.
   iii. ePortfolios are new to me and I found it very informative and a great stepping stone.
   iv. Very motivating, feel it is do-able.
e. Participant Comments: Teacher Presentation
   i. Very motivating, feel it is do-able.
   ii. Applicable to all year levels and good to see teachers own portfolios.
   iii. Excellent session. Lots of great ideas and inspiration.
   iv. Great!
   v. Wanted it to be hands-on.
   vi. Practical and useful information, clear, visual instructions were helpful to follow.
   vii. Great to have teachers sharing real materials, warts and all. Tom is very supportive of novices like me.

Appendix E: *ePortfolio Project* Information Resources

1. Online Information Resources

a. Details
   i. In June, 2004, a web page was constructed from the content below and posted to The Learning Place project room. It was also available through the discussion list and distributed at Workshops.

b. Introductory Information on the Web Page
   i. Title: Student Digital Portfolios
   ii. This page was created for the Digital Portfolio Network, a group of teachers and administrators interested in the development of Student Digital Portfolio.
   iii. Supported and funded by Education Queensland (Toowoomba District) and the Toowoomba Technology Mathematics and Science Centre of Excellence.
   iv. These sites may be of value if you are looking for ideas on developing portfolios and how they could be used in your classroom or school. Please email me if you know of any other sites and I will add them to the list. Tom Otto, Principal, Withcott State School tom.otto@eq.edu.au

c. Content
   i. Mt Edgecumbe High School (Alaska)
      An example of a portfolio framework. Student portfolios may be accessed.
      http://www.mehs.educ.state.ak.us/portfolios/portfolio.html
   ii. Alphabet Super Highway
      This site http://www.ash.udel.edu/ash/index.html has a section on portfolios at http://www.ash.udel.edu/ash/teacher/portfolio.html
         What are electronic portfolios?
         Why use electronic portfolios?
         Creating electronic portfolios
         Examples of portfolios
   iii. Tammy's Technology Tips
      This site http://www.essdack.org/tips/index.html has a section on portfolios at http://www.essdack.org/port/
         Why electronic portfolios?
         What to include in an electronic portfolio
         Assessment of electronic portfolio
         How to create an electronic portfolio
         Example of an electronic portfolio
   iv. Coalition of Essential Schools
      "The Digital Portfolio: A Richer Picture of Student Performance" is sponsored by the Coalition of Essential Schools, California and was written by David Niguidula.
      http://www.essentialschools.org/cs/resources/view/ces_res/225
         Usefulness of portfolios for students leaving high school
         A tool for planning backwards
         Digital portfolio prototypes
         Design issues
         Technical considerations
         Using portfolios to enhance change
   v. Tasmania Department of Education
      Pugh, R, & Yaxley, B. (2002). Innovating or plunging into the depths of what we don't know?
      Creating and evaluating innovative online learning environments for primary and secondary students.
      http://www.e-magine.education.tas.gov.au/innovations/Papers/Papers/Innovating%20or%20Plunging.doc
         Opening a whole new world
         Developing authentic online learning
         Changing the way we see and do our learning
         The school farm can be known worldwide
         Teachers risking self, philosophy and practice

vi. Teacher reflections: Digital portfolios

http://www.e-magine.education.tas.gov.au/innovations/Papers/Papers/Digital%20Portfolio%20Teacher%20Reflections.doc

Teachers write about their experiences with portfolios

Linking student digital portfolios with essential learnings assessment principles

http://www.e-magine.education.tas.gov.au/innovations/Papers/Papers/Linking%20Digital%20Portfolios%20and%20ELs.doc

Columns matching assessment principles and digital portfolio templates

vii. Lynne Bramich (2003). So…. why digital portfolios?

http://www.e-magine.education.tas.gov.au/innovations/Papers/Papers/So%20why%20Digital%20Portfolios.doc

A principal's perspective

The power of multimedia

Reasons for using a digital portfolio

viii. Digital Portfolios: Their use in Education

Elizabeth Hartnell-Young describes her experiences during a visit to Finland where portfolios are popular.

http://www.icponline.org/feature_articles/f2_00.htm

ix. Weblogs

Reviews the use of weblogs to build an electronic portfolio

http://starfsfolk.khi.is/salvor/basics/portfolio.htm

x. Best Practices

This site shares best practices and strategies in school reform.

http://www.bobpearlman.org/BestPractices/BestPractice.htm

It links to this article on portfolios and has links to other examples.

http://www.bobpearlman.org/BestPractices/dp.htm

xi. Designing and Creating a Digital Portfolio

Students use the mind mapping program "Inspiration" in a project-based unit to create a design map and outline of their digital portfolio. Students then create a digital portfolio using webpage creation software for posting to the portfolio section of the class webpage.

http://share1.esd105.wednet.edu/bishopcj/portfolios/Digital_Portfolios.html

xii. Electronic Portfolios: Students, Teachers, and Life Long Learners

Explores examples and provides links to articles and websites.

http://www.eduscapes.com/tap/topic82.htm

What's a digital or electronic portfolio?

How can I develop a student or teacher portfolio?

How can multimedia elements be integrated into a portfolio?

xiii. Digital Portfolios: Teacher's Overview

Download a lesson on "What are digital portfolios and how can we use them?"

http://reta.nmsu.edu/Lessons/digital/index.html

xiv. Ideas Consulting

This company helps schools put digital portfolios in place. Links to examples

http://www.ideasconsulting.com/dp_main.htm

xv. Digital Portfolios: Del Ray Elementary

http://schools.monterey.k12.ca.us/~drey/disney/present1.html

Why use digital portfolios? What to include

Portfolio examples Hardware and software

Posting portfolios

xvi. Getting Started with Digital Portfolios

http://www.essentialschools.org/pub/ces_docs/resources/dp/getstart.html

Tips for getting started

Resources for learning about digital portfolios

xvii. Digital Portfolios: A Site for Information

http://home.att.net/~digitalportfolio/index.html

Introduction to digital portfolios

View sample portfolios

2. Planning for ePortfolios

a. Details
   i. The following questions were devised to assist teachers in planning for ePortfolios, and were posted to The Learning Place project room in January, 2005.

b. Content
   i. What is your context?
   ii. What purposes would ePortfolios serve?
   iii. What type of ePortfolio will meet this purpose (Summative, Formative, Marketing, or mixed)?
   iv. What resources do you have that could be used?
   v. What resources do you need to obtain?
   vi. What software are you going to use for (a) children's work (artefacts) (b) to create the ePortfolio?
   vii. What assistance/training do you need with software and hardware? Who? How? When? Where?
   viii. What assistance/training do the children need with software and hardware? Who? How? When? Where?
   ix. What pieces of children's work do you already have that could be included?
   x. What pieces of work could the children create?
   xi. What other information/data could you collect?
   xii. Who will view the ePortfolios? How? When? Where?
   xiii. What other management issues need to be considered? Time? Assistance?
   xiv. What changes will occur in teaching practices when ePortfolios are implemented?

3. ePortfolios: A Learning Tool (Booklet)

3.1 Introduction

a. The booklet *ePortfolios: A learning tool* was prepared at the beginning of 2005 from the literature review in Chapter Two and represents a summary of contemporary literature relating to ePortfolios. Also included are basic instructions on hardware and software needed to create ePortfolios, e.g., video cameras, scanners, PowerPoint, and FrontPage.
b. The booklet was uploaded to The Learning Place project room and presented by T. Otto at Workshops throughout 2005 (see appendix D). It was included in the CD-ROM of the same title and distributed to all schools in Toowoomba and The Downs Education Districts (see appendix E.4).

3.2 What is an ePortfolio

a. An ePortfolio is a purposeful collection of work, captured by electronic means, that serves as an exhibit of individual efforts, progress, and achievements in one or more areas. (Wiedmer, 1998).
b. ePortfolios have evolved from and use many of the same principles as paper based portfolios (Gibson & Barrett, 2002).
c. Information and communication technologies (ICTs) allow students and teachers to convert information from any source into "digital bits," including script, sounds, graphics, still images and video. Digitised information, called a "digital artefact" is able to be stored, transmitted, edited, or mixed to create multimedia presentations (Tosh & Werdmuller, 2004a; Negroponte, 1995).

d. The terms "electronic" and "digital" portfolio are often used synonymously. All contents of a digital portfolio are in digital format, while an electronic portfolio (ePortfolio) may contain some material in analog format (Barrett, 2001). "ePortfolio" is used here for consistency. "Portfolio" refers to paper based portfolios.
e. There are at least three types of ePortfolios (Hartnell-Young & Morriss, 1999):
   i. Summative (monitoring tool for the teacher, formal evaluation process)
      Collection of student work, tracks progress
   ii. Formative (learning tool for the user)
      Students collect, organise, and reflect on their work
   iii. Marketing (celebration and employment)
      Used in primary and secondary schools to celebrate individual or class achievements. School leavers could produce a marketing ePortfolio as a culminating activity for employment or entry to tertiary education.
f. Children in Finland as young as kindergarten level work on ePortfolios. Applications extend to tertiary level and staff development in industry. (Hartnell-Young, 2004)
g. ICTs are changing the expectations of teachers in the preparation of students for their future roles in society. Teachers who implement ePortfolios in their classrooms are making a positive response to meet the present and future needs of students.
h. ePortfolios are accessed from databases in Australia and overseas as records of people's worth as they move within and between jobs. (Hartnell-Young & Morriss, 1999)
   > In the digital age, valuing individual capabilities and talents is becoming more important that ever . . . [and] individuals are becoming increasingly responsible for managing their own career paths.
i. ePortfolios
   i. represent a meaningful application of ICTs that supports student learning
   ii. accommodate new approaches to assessment and reporting
   iii. encourage teachers and students to develop skills in using ICTs
   iv. provide a rich picture of a student's abilities
   v. demonstrate the growth of a student's learning over time (Barrett, 2003)
j. ePortfolios are a
   i. mirror: captures the reflective nature of the portfolio, allows students to "see" themselves over time
   ii. map: creates a plan and sets goals
   iii. sonnet: provides a framework, contents can showcase creativity and diversity (Barrett, 2003)

3.3 Views of Knowledge and Theories of Learning

a. Two definitions of knowledge are at the foundation of two approaches to teaching. (Loveless et al., 2001; Ravitz et al., 2000; Tucker & Batchelder, 2000)
b. Traditional transmission instruction
   i. knowledge is perceived as a static, impersonal and unchanging entity
   ii. the purpose of teaching is to help children understand and retain fundamental truths
   iii. children learn most effectively by answering questions relating to teacher or text explanations
c. Constructivism
   i. knowledge is perceived as being constructed by learners and existing within learners, growing and changing as new understandings develop from prior knowledge
   ii. learning is less concerned about facts, concepts, or laws waiting to be discovered
   iii. learning as an active rather than passive process requiring higher order or critical thinking skills
   iv. children develop new understanding by relating new ideas to prior understanding
   v. children develop new skills as required while solving concrete problems

Table E.1: Philosophy Index

Constructivist Philosophy	Traditional Philosophy
a. Knowledge is built through class and group discussions	a. Teachers describe and explain concepts, and students learn this content
b. Students need to find answers to their own questions and problems	b. A quiet classroom is important for learning;
c. Students construct concepts for themselves	c. Acquiring basic content knowledge and skill [is]primary
d. "Sense-making" and guided inquiry	d. Teacher - not students - determine activities
e. Authentic, integrated tasks	e. Instruction is built around problems with clear, easily found, correct answers
f. Diverse classroom projects.	f. Teaching facts and skills provides the foundation for later learning.

(Becker, 1998)

d. Teachers can find themselves in both the traditionalist and constructivist camp depending upon the objectives they are targeting. Need to be aware of when to be in one camp or the other and an understanding of how to be effective no matter what camp one is in (Tucker & Batchelder, 2000)
e. Teachers who use ICTs in their classrooms may change their teaching strategies to be more aligned with constructivism i.e., there is something inherent in the nature of working with ICTs that lends itself to child-centred approaches and for learning to be more child-directed. Exemplary teaching with ICTs has been defined in terms of the extent to which a constructivist teaching philosophy is embraced. (Ertmer et al., 2000)
f. Constructivist-oriented teachers
    i. use ICTs professionally in more varied ways
    ii. have greater technical expertise in the use of ICTs
    iii. use ICTs frequently with students and in more powerful ways
    iv. are more likely to seek out other teachers and become more professionally involved (Ravitz et al., 2000)
g. Print based information reinforces a view of knowledge as being static with a focus on the finality of a text, image or sound. Information presented in ePortfolios using ICTs is more fluid, facilitates a mix of sounds and images, and can be revised. The management of knowledge in print based pedagogy is different from the management of knowledge in ICT based pedagogy.

Table E.2: Views of Knowledge in Old and New Pedagogies

	Old pedagogy		New pedagogy
a.	Know as much as there is in the book and as much as the teacher says	a.	Use strategies to decide what is worth knowing in the head and what needs to be stored: not all information should be learned
b.	Teacher uses lecture to pass on his or her knowledge to the students	b.	Teacher helps students access, select, evaluate, organize, and store information coming from a wide range of sources
c.	Students dump information or organize information by categories	c.	Students organize by categories and according to a range of perspectives
d.	Students put information on paper for the teacher to see or the paper is posted on the wall for the school to see	d.	Students write to disks or publish on the web for parents, relatives and a wider audience to see
e.	Paper journals and books as the source of knowledge	e.	Online journals and books replacing established protocols for writing and publishing
f.	Texts are set	f.	Texts are editable
g.	Students have limited choice of sources	g.	Students' personal choices are expected
h.	Goals using technology are not integrated or not present	h.	Integrating classroom goals with the power of technology
i.	Intellectual products such as reports are fixed on paper and finished	i.	Intellectual products are revisable living documents subject to addition, subtraction and change
j.	Report form texts with no connection to the persons producing them	j.	A range of creative multi-sensory electronic forms, such as web pages, with movement, charts, and pictures with personal connections
k.	Neat hand-written reports with every appearance of being produced by children	k.	Intellectual product has a professional look printed with colour and attention to design
l.	Students hide papers from each other, allowing only teacher to read the paper	l.	Students exchange tips about editing and revising their products
m.	Texts are brought home and shared with parents or others in person	m.	Teacher asks students to share their products with friends and relatives in an attachment or on the web as a way to revise and publish for an audience
n.	Knowledge is displayed in one form only	n.	Knowledge is written in a range of forms such as web pages, paper reports, PowerPoint presentations, by cutting and pasting the information into different programs
o.	Knowledge is displayed only in a linear form	o.	Knowledge is displayed in linear and hypertext formats. Class discusses advantages of each
p.	Students who don't use technology at a young age don't have facility with electronic tools	p.	Students use technology early and often, and discuss strategies for using tools

(Loveless et al., 2001, pp. 80-81)

3.4 Types of ePortfolios

a. Two types of ePortfolios have origins in traditional and constructivist philosophies
    i. <u>positivist or summative</u> ePortfolios are teacher centred and used for monitoring student progress as part of a formal evaluation process
    ii. <u>constructivist or formative</u> ePortfolios are student centred and act as a learning tool for the user

Table E.3: Positivist and Constructivist ePortfolios

Positivist ePortfolios	Constructivist ePortfolios
Purpose	
a. Assess learning outcomes (generally externally defined) b. Meaning is constant across users, context, and purposes c. Receptacle for examples of student work used to infer what and how much learning has occurred	a. Portfolio is a learning environment in which the learner constructs meaning b. Meaning varies across individuals, over time, and with purpose c. Summation of individual portfolios would be too complex for normative description d. Record of the processes associated with the learning itself
Items	
a. Selected items reflect outside standards and interests b. Includes tests or test-like representational situations designed by others c. Psychometric standards of reliability emphasized in judgements	a. Selected items reflect learning from the student's perspective b. Not appropriate to include tests or test-like representational situations c. Because idiosyncratic standards play an important role, less emphasis on consistency of judgements

(Paulson & Paulson, 1996a, pp. 22-23)

b. ePortfolios tend to lie on a continuum from
   i. <u>teacher centred</u> (positivist/summative) to
   ii. <u>student centred</u> (constructivist/formative) (Barrett, 2004a).
c. Teacher centred ePortfolios
   i. collections of students' work without input from the students themselves
   ii. merely a record of the students' achievements that makes use of digital recording, storage, and presentation
   iii. no changes to teaching or learning.
d. Student centred ePortfolios
   i. allow students to make choices in content and presentation
   ii. require risk taking of teachers because there is less control over curriculum content and processes
   iii. students have a role in negotiating their learning and making choices
   iv. teaching and learning changes because different conversations take place between teachers and students and different approaches are taken to activities. (Paulson & Paulson, 1996a; Barrett, 2004a; Tosh & Werdmuller, 2004b).
e. ePortfolios that lie along the continuum may have sections for teachers to specify tasks, projects, and information and sections for students to include work they initiated themselves. As well, students may be encouraged to make choices within teacher initiated projects about specific topics, sources of information, and styles of presentation.
f. ePortfolios are developmental and the format will evolve over time. Early attempts at introducing ePortfolios into a classroom may be teacher centred, and as skills and confidence grow, may become more student centred. ePortfolios that fail to make this transition, though, are likely to forfeit major benefits, including
   i. learner ownership and engagement
   ii. the emotional connection between the student and their ePortfolio (affective component)
   iii. evidence of the learner's authentic or unique voice
   iv. the ePortfolio as story
   v. the contribution of the ePortfolio to lifelong learning
   vi. the embracing of a constructivist model that supports deep learning. (Barrett & Wilkerson, 2004)
g. ePortfolios should tell a story of individual student learning (Barrett, 2004a).

   > It is the story of knowing. Knowing about things . . . Knowing oneself . . . Knowing an audience . . .Portfolios are students' own stories of what they know, why they believe they know it, and why others should be of the same opinion. A portfolio is opinion backed by fact . . . students prove what they know with samples of their work. (Paulson & Paulson, 1991)

h. An ePortfolio is done <u>by</u> the student, not <u>to</u> the student (Paulson, Paulson, & Meyer, 1996). Learners must be motivated by an emotional connection with the ePortfolio driven by ownership, personal engagement, and a feeling of being in control. Similar to a book and its author, an ePortfolio should reflect the learner's unique voice, which contributes to the authenticity of the ePortfolio. The advantage of using ICTs is that images and sounds can be integrated into the presentation to enhance a viewer's perception of the learner. (Barrett, 2004a)
i. Students need to learn how to be reflective. It should not be assumed that all students will develop the skill at the same rate. Reflections that students write should
   i. be unique

ii. develop a connection between learners and viewers
iii. make an important contribution to the deep learning
iv. act as a tool to integrate learning
v. assist students to be self-directive and lifelong learners. (Barrett, 2004a)

j. Deep learning means "getting below the surface" of a topic, while breadth refers to the "extensions, variety, and connections needed to relate all the separate ideas." (Burke, Fogarty, & Belgrad, 2002)

Table E.4: Deep Learning versus Surface Learning

	Attributes of Deep Learning		Attributes of Surface Learning
a.	Learners relate ideas to previous knowledge and experience	a.	Learners treat the course as unrelated bits of knowledge
b.	Learners look for patterns and unrelated principles	b.	Learners memorize facts and carry out procedures routinely
c.	Learners check evidence and relate it to conclusions	c.	Learners find difficulty in making sense of new ideas presented
d.	Learners examine logic and argument cautiously and critically	d.	Learners see little value or meaning in either courses or tasks
e.	Learners are aware of the understanding that develops while learning	e.	Learners study without reflecting on either purpose of strategy
f.	Learners become interested in the course content	f.	Learners feel undue pressure and worry about work

(Barrett, 2004a)

3.5 Types of Assessment

a. The two types of ePortfolios are concerned with two types of assessment
i. assessment <u>of</u> learning (summative ePortfolios)
ii. assessment <u>for</u> learning (formative ePortfolios) (Stiggins, 2002)

Table E.5: Portfolios to Support Assessment "of" and "for" Learning

	Assessment "of" Learning		Assessment "for" Learning
a.	Checks what has been learned to date	a.	Checks learning to decide what to do next
b.	Is designed for those not directly involved in daily learning and teaching	b.	Is designed to assist teachers and students
c.	Is presented in a formal report	c.	Is used in conversation about learning
d.	Usually gathers information into easily digestible numbers, scores and grades	d.	Usually detailed, specific and descriptive feedback in words (instead of numbers, scores and grades)
e.	Usually compares the student's learning with either other students or the 'standard' for a grade level	e.	Usually focused on improvement, compared with the student's 'previous best' and progress toward a standard
f.	Does not need to involve the student	f.	Needs to involve the student - the person most able to improve learning
	Portfolios that Support Assessment "of" Learning		**Portfolios that Support Assessment "for" Learning**
a.	Purpose of portfolio prescribed by institution	a.	Purpose of portfolio agreed upon with learner
b.	Artefacts mandated by institution to determine outcomes of instruction	b.	Artefacts selected by learner to tell the story of their learning
c.	Portfolio usually developed at the end of a class, term or program - time limited	c.	Portfolio maintained on an ongoing basis throughout the class, term or program - time flexible
d.	Portfolio and/or artefacts usually "scored" based on a rubric and quantitative data is collected for external audiences	d.	Portfolio and artefacts reviewed with learner and used to provide feedback to improve learning
e.	Portfolio is usually structured around a set of outcomes, goals or standards	e.	Portfolio organization is determined by learner or negotiated with mentor/advisor/teacher
f.	Sometimes used to make high stakes decisions	f.	Rarely used for high stakes decisions
g.	Summative - what has been learned to date? (Past to present)	g.	Formative - what are the learning needs in the future? (Present to future)
h.	Requires Extrinsic motivation	h.	Fosters Intrinsic motivation - engages the learner
i.	Audience: external - little choice	i.	Audience: learner, family, friends - learner can choose

(Barrett, 2004a)

b. ePortfolios are a vehicle for students to be actively engaged in the reporting process. In student led conferences, students may sit with their parents and/or teachers and walk them through the work they have accomplished (Paulson & Paulson, 1996b).

c. When parents view their child's ePortfolio they should recognise
i. the individuality of their child and their achievements
ii. concrete evidence of progress to meet accountability expectations
iii. the teacher's beliefs about learning
iv. the teacher's organisation of instruction (Hebert, 1996).

d. Many indicators of a student's progress may not be measurable in a paper and pencil test
i. skills (handwriting, word spacing, number facts)
ii. student's control over information
iii. higher-level skills and understanding

iv. personal characteristics and habits of mind (curiosity, inventiveness, willingness to take risks, self-confidence, sociability) (Engel, 1996)

e. ePortfolios should reflect the ten features of authentic assessment
   i. Meaningful tasks
   ii. Multiple assessments
   iii. Quality products
   iv. Higher-order thinking
   v. Positive interaction
   vi. Clear tasks and standards
   vii. Self-reflections
   viii. Transfer into life
   ix. Ongoing or informative
   x. Integration of knowledge (Burke, Fogarty, & Belgrad, 1996).

3.6 Multiple Intelligences

a. ePortfolios facilitate different ways to organize and present information of different types and origins e.g., links may take the viewer to a document, a video, a photo, a drawing, or a musical piece.
b. Student work no longer needs to be viewed in a linear fashion as links can take the viewer to any part of the ePortfolio, or through a sequence designed by the student. Different types of information can be presented side by side.
c. The way ePortfolios are created should give viewers insights into students' preferences and ways of organizing learning (see Table E6).

Table E.6: Multimedia Contribution to Gardener's Multiple Intelligences Theory

Intelligence		Description	Multimedia Contribution
1.	Logical/Mathematical (scientific thinking)	This intelligence deals with inductive and deductive thinking and reasoning, numbers, and the recognition of abstract patterns	Text and data; tables and graphs; comparative analysis of teacher's work over time links to related documents
2.	Verbal/Linguistic	This intelligence is related to words and language, written and spoken	Text both written and oral; creative forms of expression; sound; variety of text forms, formats, fonts, and design
3.	Visual/Spatial	This intelligence relies on the sense of sight and being able to visualize an object	Graphics; links within the portfolio and to other sites; logos, images; creative forms of expression
4.	Bodily/Kinesthetic	This intelligence is related to physical movement and the knowings/ wisdom of the body	Producer is "learning by doing"; ability to move through the portfolio (not a static page); Reader can create own movement through portfolio
5.	Musical/Rhythmic	This intelligence is based on the recognition of tonal patterns, sounds, and a sensitivity to rhythm and beats	Sound which captures mood, style, feelings, etc.; video
6.	Interpersonal	This intelligence operates primarily through person-to-person relationships and communication	Photographs of self; photographs of others involved; comments about self and feedback from others
7.	Intrapersonal	This intelligence relates to inner states of being, self-reflection, metacognition, and awareness of meta-spiritual realities	Reflection by self and others; planning and production requires metacognition; integration of values and action through linked material
8.	Naturalist	This intelligence relates to recognizing relationships and systems within one's environment	Organization of materials and links into a system of levels of information

(Hartnell-Young & Morriss, 1999)

3.7 Information Literacy

a. Information literacy is the ability to access, evaluate and use information from a variety of sources. (Doyle, 1992)
b. An information literate person
   i. recognizes the need for information
   ii. recognizes that accurate and complete information is the basis for intelligent decision making
   iii. formulates questions based on information needs
   iv. identifies potential sources of information
   v. develops successful search strategies
   vi. accesses sources of information including computer-based and other technologies
   vii. evaluates information
   viii. organizes information for practical application
   ix. integrates new information into an existing body of knowledge
   x. uses information in critical thinking and problem solving (Doyle, 1992, p. 2)
c. Students working on ePortfolios develop the skills of information literacy when
   i. participating in learning tasks designed to involve these skills

ii. selecting artefacts for inclusion
iii. evaluating artefacts and determining how they can be integrated and organized into the ePortfolio as a whole project

3.8 Content of ePortfolios

a. The principles developed to create paper based portfolios also apply to ePortfolios
   i. Project purposes (examine the big picture)
   ii. Collect and organise artefacts
   iii. Select key artefacts
   iv. Interject personality
   v. Reflect metacognitively (reflect meaning and value to the student)
   vi. Inspect to self-assess (long-term and short-term goals)
   vii. Perfect and evaluate (fine tune content)
   viii. Connect and conference (meaningful dialogue - students, teachers, and parents)
   ix. Inject/Eject to update (keeps the portfolio fresh)
   x. Respect accomplishments (exhibiting the portfolio) (Burke et al., 1996)
b. Paper based portfolios include: projects; co-operative works; interviews; simulations; artwork; graphic organizers; peer evaluations; computer programs; self-assessments; musical pieces; logs and journals; observation checklists; videos; and performances (Burke et al., 1996)
c. ePortfolios are not meant to include everything that a student produces. A range of work samples should be collected that represent progress, rather than just the best work.
d. ePortfolios are evidence of students' achievements of specified goals relating to
   i. <u>Products</u> (such as essays, reports, lists of books that the student has read, a list of problems solved, models, work samples etc.);
   ii. <u>Processes</u> (such as goals for learning, outlines, drafts, strategy assessments, interim evidence, unfinished products, and notes on progress); and
   iii. <u>Students' perceptions of their learning</u> (such as motivation, and self-assessments of learning). (Barrett, 2002)

   Teachers provide feedback to validate the evidence.
e. ePortfolios have
   i. a table of contents
   ii. tasks with: date of the work; description of the task; students' reflections; links to the areas of assessment involved in the task.
f. Viewers of a learning task in an ePortfolio must explicitly or implicitly recognise
   i. the rationale (purpose for forming the portfolio)
   ii. intents (its goals)
   iii. contents (the actual displays)
   iv. standards (what is good and not-so-good performance)
   v. judgments (what the contents tell us) (Paulson, Paulson, & Meyer, 1996).
g. At the beginning of a learning task, students should ask
   i. What do I plan to accomplish with this task?
   ii. How I plan to get there
   iii. My strategies for accomplishing this task
h. Students should review their ePortfolios periodically to add new material and reflections.
i. A "comments" button is used by students to review and provide feedback for each other's work. Reflecting on the work of others encourages self-reflection, and students learn about learning (see how others have approached the same task as a basis on which to compare their own work, see the processes involved in learning, and appreciate that different people learn in different ways). (Paulson, Paulson, & Meyer, 1996)
j. One of the earliest tasks in creating ePortfolios is to establish purpose. This may change as the year progresses, and ePortfolios may have several purposes. Teachers and students would benefit from viewing models of ePortfolios. (Paulson, Paulson, & Meyer, 1996)

Table E.7: Types of Evidence in ePortfolios

Type of Evidence	Evidence
1. Artefacts	a. Documents produced during normal academic work
2. Reproductions	b. Documents of student work outside the classroom
3. Attestations	c. Documentation generated about student's academic progress
4. Productions	d. Documents prepared just for the portfolios
Goal Statements	Student's personal interpretations of each specific purpose for the portfolios
Reflective Statements	Students write as they review and organize the evidence in their portfolios
Captions	Statement attached to each piece of portfolio evidence, articulating what it is, why it is evidence, and of what it is evidence

(Barton & Collins, 1997)

Table E.8: Requirements of Portfolios

Element		Requirements
1. Storage Space	a.	Store digital artefacts (with meta-tags)
	b.	Store learner self-reflection and self-assessment on each artefact
	c.	Store feedback on each artefact from a session(s) (independent validation)
	d.	Store details of the assignment with criteria for assessment (rubrics)
2. Security	a.	Ability to restrict access, setting permissions to view: artefact only; artefact with reflection; artefact with reflection and feedback
	b.	Ability to set permissions separately for faculty to view portfolio and provide feedback on work.
3. Linking & Grouping	a.	Ability to organize portfolio in a variety of ways (flexibility in organization) by: standards or learning outcomes; course; date (entered, last updated, etc.); status of work (Work in progress, ready for assessment, ready for publication)
	b.	Ability to include: goals for portfolio, contents of portfolio; learning goals or standards; resume
4. Reflection	a.	Ability to reflect on a specific grouping of artefacts to make a particular case (i.e., how this collection demonstrates achievement of standard/learning goal)
	b.	Ability to set learning goals and future direction
5. Publishing	a.	Ability to create a variety of portfolios, depending on audience and purpose
	b.	Learning portfolio (a reflective journal with artefacts; primary audience is the learner)
	c.	Assessment portfolio (a highly-structured portfolio demonstrating achievement of learning goals or standards, with independent validation and feedback on artefacts/reflections from faculty)
	d.	Employment or Marketing Portfolio (a semi-structured portfolio, developed for the purpose of making the case for suitability for a particular position)
	e.	Showcase Portfolio (a collection of artefacts, with reflections, that demonstrate growth over time, highlighting specific achievements)
	f.	Ability to individualize the portfolio, to allow creativity of expression in the presentation (to avoid the “cookie cutter” effect or identical “look and feel” of a data-base or template-based portfolio)
6. Portability	a.	Ability to archive work in portable format CD-ROM, HTML or PDF Archive, DVD
	b.	Ability to use in another institution or be maintained by learner

(Barrett, 2002)

3.9 Scanners

a. Type depicted is a Hewlett Packard 4500c.

b. Scanners are cheap and easy to use. Just need a USB connection from the scanner to the computer and the software program that comes with the scanner.

c. Scanners are used to digitize information on paper as
   i. an image or picture (photos, diagrams)
   ii. an editable version of text in Word (Optical Character Recognition - OCR)
   iii. information sent directly to the printer

d. Images can be resized during scanning, or later with Microsoft Paint.

Figure E.1: Opening page of HP Scanning software

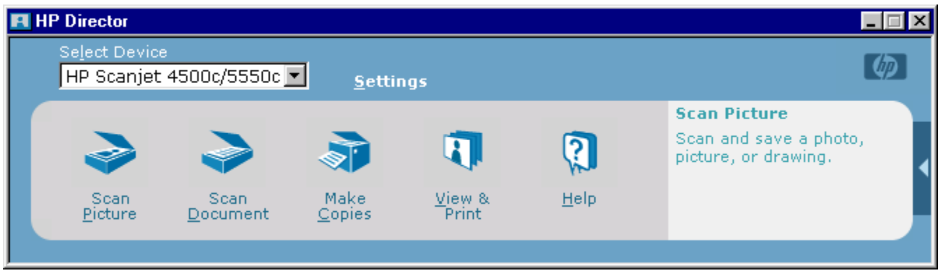


Figure E.2: Preview page of HP Scanning Software

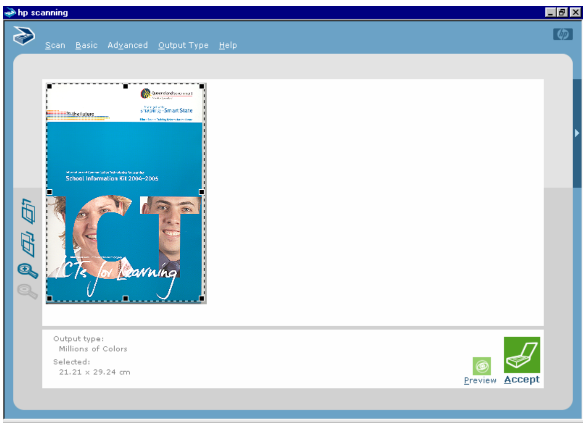
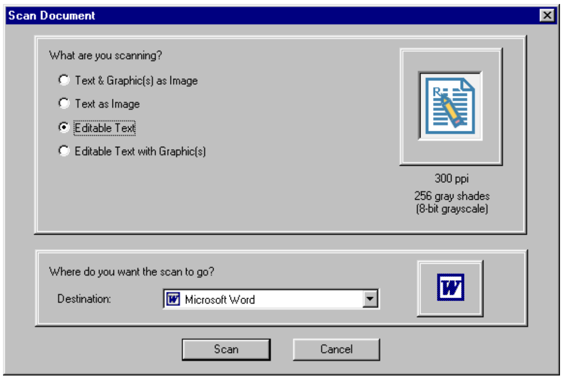


Figure E.3: Editable Text Options in HP Software



3.10 Digital Cameras

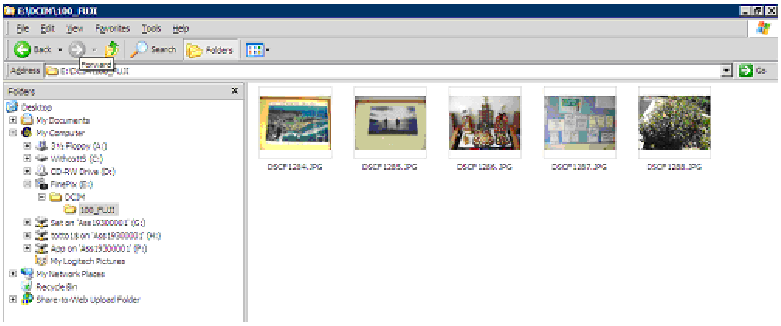
a. Type depicted is a Finepix A345 by Fujifilm with 4.1 megapixels (about $A300 in 2005).

b. Some digital cameras can take short movies, and digital video cameras have a button to take still shots. Still images can be taken from a digital video using an editing program.

c. The camera comes with a software program, but this is not required for downloading photos when using Windows XP. When photos have been taken, connect the camera by USB cable to the computer and open the camera's directory using My Computer or Windows Explorer. The images can then be cut or copied into a directory on the computer or server.

d. The images may be edited or inserted directly into documents or presentations. Cameras usually come with their own editing program, or you may use Paint or a program such as Paint Shop Pro. lrfanView is a program available free as a download on the Internet. It is easy to use and very useful for renaming or resizing batches of photos and cropping photos.

Figure E.4: Photos as they appear in thumbnail view in Windows Explorer



3.11 Digital Video Cameras

a. Type depicted is a Canon MV600i ($A850 in 2004)

b. Some still cameras can take short movies, and digital video cameras have a button that takes still shots. Still images can also be taken from a digital video using an editing program.

c. These cameras are very powerful, can take a video of the ground in a plane at 10000m, good in low light, have an in-built microphone sufficient for most purposes, and are quite sturdy.

d. Features

   i. Zoom button
   ii. Photo button
   iii. Switch from camera (taking movies) to video (watching movies)
   iv. Video buttons (for watching movies) same as a VCR
   v. Removable battery and recharger (extra batteries available, run for 1-3 hrs)
   vi. Cable jacks for microphone, link to computer, link to TV/VCR
   vii. Tape inserts like a VCR (looks like a small VCR tape, cost $A8)
   viii. Detachable lighting (an extra)
   ix. Two viewing screens - an eyepiece and a small screen that opens out and can be swivelled in all directions, even facing the subject
   x. Menu - two buttons operate the menu, easy to use, settings rarely need changing
   xi. Can hook up directly to a TV to watch the video
   xii. Can hook up to the VCR to record the video on VCR tape.

e. May need to download to and edit on a dedicated computer with a larger capacity, and then transfer files to other computers.

f. During video capture and editing it is necessary to consider the size of the file being created and limit the length of the video.

g. Video editing software depicted is VideoStudio (ver. 7 by Ulead), which comes as the standard program with the Optima Video Editing computer. Other video editing software includes Movie Maker.

h. Most video editing software will include

   i. <u>Capture</u> - The camera is connected to a card in the computer by cable and the computer takes over control of the camera and downloads the video. A section of the video (thumbnail) is displayed so that the viewer may see where it is (see below on right hand side)

   ii. <u>Edit</u> - The thumbnails are dragged into a section at the bottom of the screen and may be cut and pieced together. The editing takes place as a "project," which can be previewed in the screen in the middle.

   iii. <u>Share</u> - The "project' is created in a special format that needs to be changed (rendered) to a format that you can play on a computer or CD.

Figure E.5: Capture Screen in VideoStudio

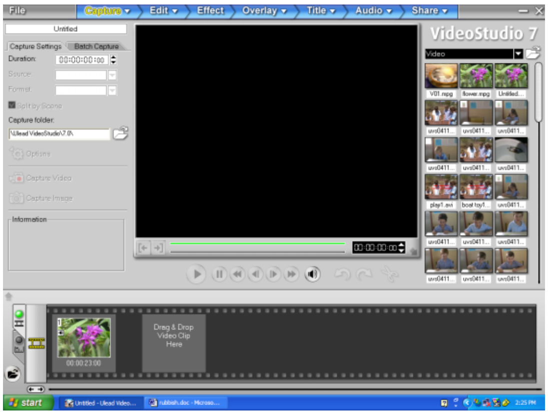


Figure E.6: Edit Screen in VideoStudio

Figure E.7: Share Screen in VideoStudio

3.12 Software

a. Two types of software are used to create ePortfolios.
    i. Generic Tools e.g., word processors, HTML editors, multimedia authoring tools, portable document format; or
    ii. Customised Systems e.g., servers, programming and databases. (Gibson & Barrett, 2002)

b. Generic tools are available to all teachers through the Education Queensland agreement with Microsoft - Word, PowerPoint, Access, Excel, and FrontPage. Files may be transferred from one application to another.

c. ePortfolios can be created with
    i. FrontPage (HTML editor, web page maker)
    ii. PowerPoint (presentation)

d. Adobe Acrobat Reader is available free on the Internet. Adobe Acrobat Writer is used to convert Word to PDF (Portable Document Format), and not expensive. PDF documents are smaller and easier to up/down load, and can be locked with a security password so they cannot be changed.

e. Recordable CD-ROM (CD-R) drives are commonly available to provide a backup of work and for transferring ePortfolios to home computers. Cartridge drives installed on servers may also be used for larger storage capacity.

f. Hyperlinks can be created between goals, outcomes, and artefacts. Internet links and email access may be desirable.

g. The selected software needs to
    i. be available to the audience (e.g., parents)
    ii. suit goals
    iii. be within the skills of students and teachers
    iv. work on existing equipment.

h. File Management
    i. Folders (directories) may contain other folders (sub-directories) or store children's files
    ii. Folders and files may be copied, cut and pasted
    iii. Using the same letter or word at the start of a file or folder will group them together or in sequence e.g., A Writing, B Writing, C Writing
    iv. A: drive is always the 3.5" disk..
    v. Computers may have one or more drives e.g., C: drive and D: Drive.
    vi. The CD-ROM may be "E: drive or F: drive."
    vii. Server have a drive dedicated for data

Table E.9: Applications of Software for ePortfolios

	Software		Applications
1.	Databases e.g., Access	a. b.	Teacher centred portfolio tools to keep track of achievement Relational databases are series of interlinked structured data files with common fields e.g., data files with personal details, list of standards, and achievements
2.	Hypermedia e.g., HyperStudio	a.	Allows integration of various media types in a single file (individual screens described as cards linked together by buttons)
3.	Multimedia Authoring e.g., Macromedia Director	a. b.	Icon based authoring system in which the author builds a flow chart to create a presentation Create self running programs without player software
4.	Web Pages e.g., FrontPage, Netscape Composer	a. b. c.	Use built in tools to create web pages Convert Word documents into Web pages Create hyperlinks between goals and artefacts
5.	PDF Documents e.g., Adobe Acrobat	a. b. c. d.	Create documents or convert Word documents using Adobe PDF Writer Easy to access on free Acrobat Reader software Navigate using bookmarks or hypertext links Security coding available
6.	Multimedia Slideshows e.g., PowerPoint	a. b.	Slides may be viewed in linear sequence or hyperlinked to each other Allow integration of sound and video
7.	Digital Video	a. b.	Presentation improved by editing, addition of sound and script Large file size

(Adapted from Barrett, 2000a)

Table E.10: Levels of ePortfolio Software

Level	Software
1	No digital artefacts, some videotape artefacts
2	Word processing or other commonly-used files stored in electronic folders on a hard drive, floppy diskette or LAN server
3	Databases, hypermedia or slide shows (e.g., PowerPoint), stored on a hard drive, Zip, floppy diskette or LAN server
4	Portable Document Format (Adobe Acrobat PDF files), stored on a hard drive, Zip, Jaz, CD-R/W, or LAN server
5	HTML-based web pages, created with a web authoring program and posted to a WWW server
6	Multimedia authoring program, such as Macromedia Authorware or Director, pressed to CD-R/W or posted to WWW in streaming format

(Barrett, 2000b)

3.13 Microsoft PowerPoint

a. Creates slides in a presentation.
b. Pages may be viewed in sequence, or pages can be hyperlinked to other pages in the presentation (under “Insert; Hyperlink”). This is the approach used in ePortfolios.
c. Hyperlinks may be inserted for email and Internet sites
d. “Pack and go” puts all the files on a disk necessary to run the presentation without needing PowerPoint (“File; Pack and go”). By using this facility, children do not need to have PowerPoint on their home computers to view a presentation.
e. Colours, patterns or pictures may be used for backgrounds.
f. Buttons may be inserted for hyperlinks (e.g., next page, home page).
g. Text can be inserted in a text box or by using Word Art (try white text on a coloured background).
h. Pictures, videos and sounds can be inserted.
i. Children enjoy experimenting with different transitions within and between slides.

Figure E.8: Opening page in PowerPoint

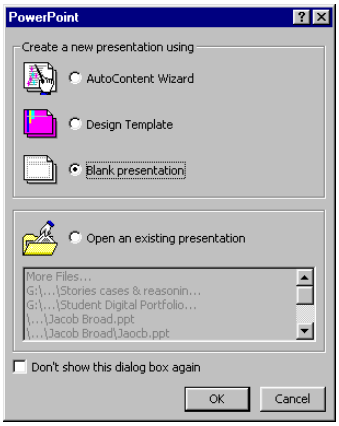
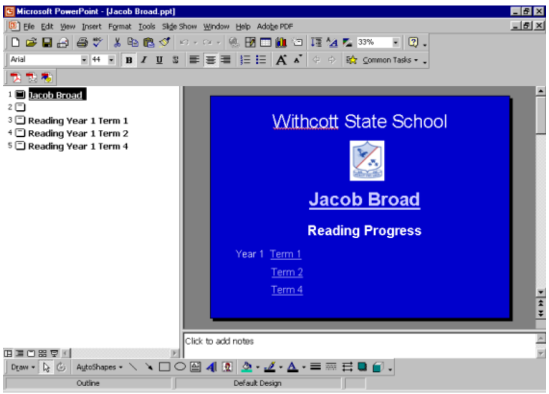


Figure E.9: Working page in PowerPoint

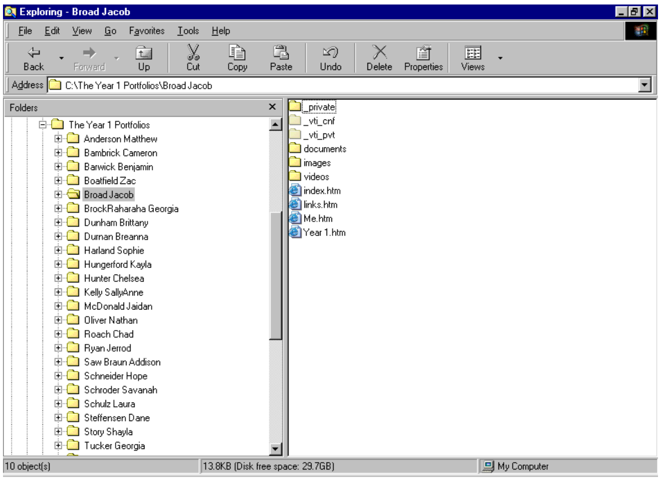


3.14 Microsoft FrontPage

a. Requires a reasonable level of skill, but is easy to use once the basic concept is understood.
b. Need to move between views where a page is created, and views of the page as it will look on the Internet.
c. Files to be included in the presentation may be stored in separate directories (e.g., documents, videos, images). If a file is moved or the name of the directory is changed, then a new hyperlink will have to be created).
d. Presentations may be easily uploaded to the Internet using the Managed Internet Service (MIS).

e. Presentations do not need to be uploaded to the Internet, and may simply be viewed on a computer or on the school's Intranet.

Figure E.10: Extra Files Created in FrontPage



3.15 ePortfolio Stages of Development

a. ePortfolios lie in a continuum of development from teacher to student centred, which may relate to a teacher's confidence and the purpose for the ePortfolios. This list of paper based portfolios is an example of the continuum.
   i. Folder of work
   ii. Collection of work
   iii. Teacher-organised portfolio
   iv. Showcase portfolio
   v. Progress portfolio
   vi. Teacher-and-child portfolio
   vii. Child-organised. (Barrett, 2004a)

b. Use these tables to locate the present stage of an ePortfolio's development, and see what could be achieved by moving on to another level.

Table E.11: Levels of Portfolio Implementation

Level	Portfolio Implementation
0	A collection of artefacts
1	A collection of artefacts with reflective statements
2	A collection of artefacts with reflective statements & self-assessment
	A learning portfolio (journal entries with associated artefacts)
	A showcase or marketing portfolio (a celebration of learning or an employment portfolio)
3	A collection of artefacts with reflective statements & self-assessment, linked to course outcomes, program outcomes, or standards
	A non-validated assessment portfolio
4	A course-centred portfolio: A collection of artefacts with reflective comments & self-assessment, linked to course outcomes including validation & feedback from faculty, used for course assessment
5	A program-centred portfolio: A collection of artefacts with reflective comments & self-assessment, linked to program outcomes including validation & feedback from faculty, used for program assessment
6	A standards (or goals)-centred portfolio: A collection of artefacts with reflective comments & self-assessment, linked to standards including validation & feedback from faculty, used for individual learning support and program assessment
7	A learner-centred portfolio: A collection of artefacts with reflective comments & self-assessment, linked to learner goals or outcomes including validation & feedback from faculty, used to support individual learning, growth, professional development.

(Barrett, 2002)

Table E.12: Developmental Stages of ePortfolios

Generic Tool	Minimally Present	Mixed	Fully developed
1. Planning and Goal Setting Scheduling, timelines, project management systems, visualization, databases, spreadsheets	Planning takes place "off line" and artefacts of the process are not expected in the portfolio	Documentation of planning and the evolution of goal setting are acceptable content for portfolios	Expectations include the documentation and portfolio presence of planning/goal setting and adjustments the story of as part of growth over time
2. Creativity Tools for visualization, animation, audio, video, databases, spreadsheet representations, graphic production	Inflexible templates or stock multimedia elements (sounds, graphics, logos) are used by learners for the organization and display of their portfolios	Learners are encouraged to create some original elements or organizational aspects of their portfolios	Learners are taught and supported in the development of rich and varied, expressive multimedia skills. Portfolios display the individual creativity of each learner
3. Communications: e-mail, threaded discussions, video conference systems, webcasts	Program does not include tele-communications in its processes or documentation	Some telecommunications are used to develop plans, goals, work products, and the creation of portfolios. Some learners document their communications for inclusion	Portfolios show evidence of use of telecommunication tools in planning, goal setting, work improvement over time, and final products
4. Collaboration Threaded discussions, net meetings, video conferences, whiteboards, asynchronous work spaces	Program does not emphasize or there is little evidence of collaboration in portfolios	Program uses some generic tools for collaborative work and encourages learners to include evidence of collaboration in at least one portfolio	Documentation from generic collaboration tools is prompted and supported in all portfolios
5. Reflective Process Word processor, video, audio, multimedia production	Written or audio reflections primarily deal with the alignment of work to program requirements or personal statements	Reflections using multimedia expression are encouraged. Alignment of purpose and audience may have a single focus and reside in one portfolio, (e.g., graduation portfolio demonstrating that standards have been addressed	Learners are collaboratively assisted to reflect and create alignment of purpose and audience in more than one portfolio, ideally, a working folio. a program completion folio, and one or more other folios for employment, public and private purposes
6. Connection Capabilities Hypertext capabilities in word processors or publication tools, web page applications, raw HTML	Some learners invent their own ways of making a few linkages to a schema	Several learners make some linkages to or publish their work alongside at least one schema	Learners are expected to extensively link their work to more than one schema, depending on audience and purpose of portfolio
7. Organizational Flexibility Hypertext capabilities	Learners use few if any hypertext or database capabilities to flexibly organise their work	Methods of flexible organization are taught and encouraged, but not expected of all learners	All learners maintain more than one way to organise their work collections and utilize more than one organizational framework to represent their work
8. Display Flexibility and Transportability Many tools have display possibilities, advanced uses include database driven web displays, active server pages, and dynamic HTML	Display of works is essentially the same from page to page or slide to slide. Generic tools are used with their most basic default capabilities	Generic tools are used with some of their more advanced hypermedia features	Portfolios show evidence that students can use the advanced hypermedia features of generic tools to create flexible or dynamic displays of their work. Final format is portable and transferable in digital format
9. Data & Information Databases, spreadsheets, visualization tools, GIS, web searches, virtual libraries	Portfolios give a limited picture of the student in terms of their own intentions for learning and the programs' intentions for their learning	Portfolios give a reasonably valid and detailed picture of some aspects of the student's learning and show some of the balance of program and individual intentions of learning.	Each portfolio is a rich, valid and balanced picture of an individual student (their intentions in learning balanced with the program's intentions for their learning) that is in part, not commensurable with other students
10. Start-up Costs & Maintenance Servers: system software, lab licenses	Program has little or low centralized support for applications, updates, server space and access, multiple licenses for products from uncoordinated buying across the' organization	Program provides periodic support with a few options for training, but the type and depth of support places a high burden on some people creating barriers to ubiquitous implementation	Program has a continuously improving IT support that is client centred on the learning program and all of its members. IT provides low cost group purchases with automatic updates of the software suite. Provides on demand and continuous training and support to both learners and teachers

(Adapted from Gibson & Barrett, 2002)

Table E.13: Portfolio and Multimedia Development

ePortfolio Development	Portfolio Development	Multimedia Develop.	Processes
1. Defining Context & Goals	Purpose & Audience	Decide, Assess	Determine needs, goals & audience
2. The Working Portfolio	Collect, Interject	Design, Plan	Determine content & sequence
3. The Reflective Portfolio	Select, Reflect, Direct	Develop	Gather and organize multimedia material
4. The Connected Portfolio	Inspect, Perfect, Connect	Implement, Evaluate	Present & evaluate effectiveness
5. The Presentation Portfolio	Respect (Celebrate	Present, Publish	Share with others

(Barrett, 2000b)

Table E.14: Stages of ePortfolio Development

Stages		Processes
Stage 1 Defining the Portfolio Context	a.	Identify the assessment context
	b.	Identify the purpose of the portfolio
	c.	Identify the learner outcome goals (from standards)
	d.	Know the primary audience to decide format and storage
	e.	Identify available resources (hardware and software)
	f.	Identify technology skills (current and to develop)
Stage 2 The Working Portfolio	a.	From goals and standards, determine the types of portfolio artefacts to be collected
	b.	Select the software development tools for context & from available resources (software controls, restricts, or enhances the portfolio development process, and should match the vision and style of the portfolio developer
	c.	Collect artefacts, store on a hard drive, a server, or videotape
	d.	Set up electronic folders for each standard to organize the artefacts
	e.	Use a word processor, database, hypermedia software or slide show to articulate the goals/standards to be demonstrated in the portfolio and to organize the artefacts
	f.	Identify storage and presentation medium (i.e., computer hard disk, videotape, local-area network, a WWW server, CD-ROM, etc.)
	g.	Gather multimedia materials that represent achievement (from different points of time to demonstrate growth and learning that has taken place)
	h.	Write short reflective statements with each artefact stored, to capture significance at the time it is created
	i.	List and organize the artefacts
	j.	Use a scanner, camera, sound digitizing to digitize artefacts
	k.	Use multimedia to add style and individuality to the portfolio
	l.	Save work in a format that can be easily used
Stage 3 The Reflective Portfolio	a.	Review the reflective statements written for each artefact as it was stored, elaborating on its meaning and value and why it is selected for the presentation portfolio
	b.	Write general reflective statements on the achievement of the goals or standards
	c.	Select the artefacts that represent achievement of the standards or goals
	d.	Set learning goals for the future from the reflections and feedback (ask What? So what? Now what?)
Stage 4 The Connected Portfolio	a.	Create hypertext links between goals, work samples, rubrics, and reflections
	b.	Insert multimedia artefacts
	c.	Create a table of contents to structure the portfolio
	d.	Select software that allows easy creation of hypertext links
	e.	Linking reflections to artefacts makes the thinking process (artefacts to evidence) explicit
	f.	A single artefact may demonstrate multiple standards
	g.	Use the evidence to make instruction/learning or professional development decisions
Stage 5 The Presentation Portfolio	a.	Record the portfolio to an appropriate presentation and storage medium (different for working, formal or presentation portfolios
	b.	Present the portfolio before an audience (real or virtual) and celebrate the accomplishments (public commitment provides motivation to carry out the plan of a formative portfolio)
	c.	Evaluate the portfolio's effectiveness in light of its purpose and the assessment context

(Adapted from Barrett, 2000a)

3.16 Evaluating ePortfolios

a. Helpful hints may be displayed for student reference
   i. simple and natural dialogue
   ii. speak the users' language
   iii. minimize the users' memory load
   iv. consistency
   v. feedback
   vi. clearly marked exits
   vii. shortcuts
   viii. precise and constructive error messages
   ix. prevent errors
   x. help and documentation (Nielsen, 1994).
b. View presentations as they are created to see how they look and work (walk through).
c. Consider
   i. content (what purposes do you have, what image of yourself do you wish to portray)
   ii. presentation (graphics, navigation)
   iii. links (online resources, email) (Grassian, 2003)

Table E.15: Evaluating ePortfolios

	Criteria		Indicators
1.	Operational Fundamentals Basic criteria that apply throughout the e-Portfolio so that the site functions well	a.	Appearance and navigation are clear and consistent
		b.	All links work and media displays as intended
		c.	Images are optimised for the web
		d.	All programming is appropriate (not too limited or too flashy)
		e.	Text is readable (fonts, sizes, and contrast)
		f.	Spelling and grammar are correct
		g.	Published materials respect copyright laws
2.	Evidence Academic, co-curricular and personal evidence	a.	Organizational scheme connects all evidence into an integrated whole
		b.	Features or showcases a specific piece of evidence
		c.	Shows depth in major and related experience
		d.	Shows breadth of knowledge and experience
		e.	Includes a resume (one page, printer friendly)
3.	Reflection An underlying personal yet professional message is integrated into the ePortfolio	a.	Audience and purpose of ePortfolio is described or is obvious
		b.	Addresses the Seven Career & Essential Life skills
		c.	Reflective comments about evidence as well as reflective comments about what this evidence says about the student is integrated into the ePortfolio
		d.	Includes short-term goals (skills you need to add/improve, experience you are seeking)
		e.	Includes long-term goals (professional and/or personal aims)
		f.	Interpretation of your own learning is an important theme of the ePortfolio

(Penn State, 2004)

3.17 Issues with ePortfolios

a. Need hardware e.g., sufficient computers, scanners, cameras, secure information storage and back up.
b. Teachers need to be supported as they learn to use the equipment and manage hardware and software issues.
c. Try to eliminate the reoccurrence of small but irritating and time consuming issues such forgotten passwords e.g., have a password list handy.
d. Consider student protection and privacy when publishing ePortfolios.
e. Consider copyright as students will be copying material into their ePortfolio.
f. Consider ownership of ePortfolios e.g., intellectual property may be an issue if a student develops a marketable innovation as part of their work.
g. Guidelines may need to be developed concerning censorship, i.e., what students may or may not include in their ePortfolios. This is not an easy issue to resolve if student ownership of an ePortfolio is to be encouraged.
h. ePortfolios have a purpose and the purpose must be reviewed. ePortfolios represent a large investment in time, effort, and resources, and need to be making worthwhile contributions to learning, or at least meeting intended purposes.
i. ePortfolios require thoughtful planning, creativity, and a willingness to be innovative. We do not all have these attributes and some teachers and students will need more encouragement and support than others.
j. Other issues include
    i. lamination: ePortfolio becomes an exhibition, a self-advertisement
    ii. heavy lifting: is the hard work in an ePortfolio worth the extra effort?
    iii. trivialization: stuff is documented that isn't worth reflecting upon
    iv. perversion: will the ePortfolio become objective, a cumbersome multiple choice test used to compare students
    v. misrepresentation: will an emphasis on isolated examples of best work misrepresent students typical work so as not to reflect competency? (Shulman,1998)

3.18 A Plan of Action

a. These questions may stimulate thinking about ePortfolios and the issues that need to be addressed.
    i. What is your context?
    ii. What purposes would ePortfolios serve in your classroom or school?
    iii. Who is the audience and what ICTs do they have to view ePortfolios?
    iv. What elements need to be included in the design of your ePortfolios?
    v. What software would be used to organise and view the student's work (e.g., FrontPage, PowerPoint)?
    vi. What software would be used for creating artefacts (e.g., Word, Publisher, video editing)?
    vii. What ICTs do you have and what needs to be purchased?
    viii. What skills do you and your students have in using ICTs?
    ix. How will data be stored?

x. How will time be managed (e.g., scanning and editing artefacts, reviewing ePortfolios, talking with students)?
xi. How will the ePortfolios be viewed and by whom? What privacy and security issues need to be addressed?
xii. What other management issues need to be considered?
xiii. Will your ePortfolios be teacher centred or student centred?
xiv. How will you monitor the curriculum to ensure core outcomes and literacy and numeracy skills are still being covered?
xv. What changes will occur in teaching practices when ePortfolios are implemented?
xvi. What changes will occur in conversations between teachers and students, teachers and parents, and students and parents?
xvii. How will ePortfolios change the use of ICTs in your classroom or school?
xviii. What books, articles or web sites about ePortfolios have influenced your thinking?
xix. What aspects of ePortfolios in other schools appeal/not appeal to you?
xx. What documents have you written to address issues or inform people about ePortfolios (e.g., school policy, staff notes, and newsletters)? What documents support your program (e.g., lesson plans and curriculum frameworks)?
xxi. What conversations have you had with teachers, parents, and students about ePortfolios?

b. Introducing ePortfolios into a classroom or school is an opportunity to initiate change. As with any change, there is a learning and experimentation process that requires determination, time, and effort.
c. Advice for teachers and school administrators (Barrett, 2004b)
   i. Start small and build capacity
   ii. Develop an action plan that includes
      a vision for the role of ePortfolios
      professional development to provide skills
      incentives to motivate stakeholders
      provision of resources
   iii. Work with innovators and early adopters during early exploratory stages
   iv. Find the natural leaders and engage them in planning
   v. Take the team through a change simulation
   vi. Assess competencies
   vii. Organize training activities
   viii. Model ePortfolios
   ix. Create an institutional ePortfolio that incorporates elements of individual portfolios.
   x. Teachers who are implementing ePortfolios may be another source of information and inspiration, as they are usually innovative and motivated practitioners who willingly share their experiences.
d. At some stage it is necessary to simply make a start and be prepared to learn as the project progresses.
   i. A journey of 1000 miles begins with a single step. In the world of [ePortfolios], that single step is a student saving a favourite story on a disk (Siegle, 2002)

4. *ePortfolios: A Learning Tool* (CD-ROM)

a. Details
   i. In August 2005, T. Otto assembled a CD-ROM containing information resources collected and developed through network activities. The resources were organised as a web site using FrontPage. Copies of the CD-ROM (130), labels, and instructions (see section b) were produced by T. Otto using his office computer and printer and distributed to all schools in Toowoomba and The Downs Education Districts, as well as district office personnel.
   ii. Resources contained in the CD-ROM were uploaded to the Professional Learning Community at The Learning Place web site.
b. Instructions
   i. Title: *ePortfolios: A Learning Tool*
   ii. This resource was produced and distributed by the ePortfolio Alliance (eA), a network of educators in the Toowoomba and The Downs Education Districts interested in professional learning for the classroom implementation of ePortfolios.
   iii. The aim of the network is to facilitate the development of student ePortfolio frameworks to enhance curriculum, pedagogy, assessment, and reporting initiatives through the integration of ICTs in learning.
   iv. Insert the CD into the drive. The CD should open automatically to the *Home Page*. If the CD does not open automatically, open with *My Computer* and click on *index.htm.* The contents of the CD may be copied into a folder on a computer or server and added to *Favorites*. Create a new folder, e.g., called *ePortfolios.* Insert the CD and open with *My Computer Edit/Select All*,

then *Edit/Copy*. Select the new folder, then *Edit/Paste* Click on *index.htm* to start the *Home Page.* Go to *Favorites/Add to Favorites/OK.*

v. Bonus Resources: This CD-ROM contains two bonus resources. *Integrating ICTs* was developed by the Toowoomba Technology Mathematics & Science Centre of Excellence. *ePortfolio Resources* was developed by Brett Butler, Crow's Nest State School.

vi. Structure & Contents

Table E.16: Structure and Content of the CD-ROM

Bonus *Integrating ICTs*		Home Page		Bonus *ePortfolio Resources*
1. The Issue	2. Information	3. Cases	4. Tools	5. Support
Definition Benefits The Project	Literature Review Web sites The Learning Place QSITE EQ	Written Cases Video Cases	Planning FrontPage Photo Story 3 Burn CDs Hyperlinks PDF Copyright Audio	TTMSCE The Learning Place ePortfolio Alliance Discussion List

vii. Feedback: Comments about this resource are welcome and may be emailed to tom.otto@eq.edu.edu

viii. Contact: Dr Tom Otto, Principal, Withcott State School, Withcott 4352 Phone 46149333 Fax 46149300 Email: tom.otto@eq.edu.edu Toowoomba TMSCE 275 North Street, Toowoomba Q 4530, Phone: 46390423 Fax: 46390424, Email: tmsce.toowoomba@eq.edu.au, Website: www.toowoombatmsce.com

c. Feedback

i. N. Thorpe to all principals (email): I have been asked by the ePortfolios organising group to advise you that, in next Monday's bulk mail, you will be receiving an envelope titled "ePortfolios: A Learning Tool" that contains a CD and instructions for installation. This is an all encompassing resource, i.e., "Go to Whoa!" for those interested in implementing ePortfolios. The CD is the product of the very fine work of the ePortfolios Alliance and the Technology, Mathematics and Science Centre for Excellence. Some financial and 'in kind' support has been provided by The Downs and Toowoomba districts as well. Over the past two years a strong and growing network of local teachers and schools have commenced work on developing digital portfolios which portray student achievement through the richness of digital recording. Our work has featured in papers presented at national and international conferences (2005 SITE Conference in USA). If you or interested members of staff wish to learn more about our local alliance please contact Tom Otto at Withcott 4614 9333 or Barry Dittman at the TMSCE on 4639 0423. Please note that on the pupil free day on October 10 as part of the Spotlight on Science Forum, there will be a day long 'strand' of sessions provided by ePortfolio members. Barry Dittman has the details on this day. Could you please ensure that the CD is handed on to someone in your school who will be interested in this initiative? Congratulations to the ePortfolios Alliance on this wonderful initiative.

ii. B. Butler (teacher, Crow's Nest State School) to T. Otto (email): I had a look over the CD-ROM resource. It seems really useful and well compiled. Congratulations on a great job Tom.

iii. S. Reushle (USQ Lecturer) to T. Otto (email): Thanks for sending me a copy of your e-Portfolios CD. I am looking through it at the moment - a great resource! Currently I am leading a cross-University group to develop the first course in our newly accredited Graduate Certificate in Tertiary Teaching and Learning. I am the program coordinator, and also the course examiner for the first course, TEA5101 *Exploring Teaching & Learning in Tertiary Contexts: A Critical Self-Analysis.* This course is being offered in Semester 3 2005 as an on campus course, and then the program will become fully online in 2006. The aim of the first course is to: enable participants to become familiar with fundamental educational theories; identify particular teaching strengths; and to recognise individual professional development needs. A key outcome of this course is the development of a "teaching capacity enhancement plan" (TCEP), which will provide a self-constructed, individualised plan for further study including formal and informal courses and work-based projects. I would like to introduce the concept of "ePortfolios" as part of the creation of a TCEP and had been looking for a framework to use. I am wondering if you would be willing to allow me to use the resources from your CD to guide my deliberations, with due acknowledgement, of course? I also recently led a university group to develop the USQ Academic Staff Development Framework and you will see that our intention is for all academic staff to develop an e-portfolio. My hope is to design and offer a professional development workshop as part of our existing Academic Staff Development Program (see http://www.usq.edu.au/hr/odt/acstaff/default.htm) on developing ePortfolios. I would certainly welcome any suggestions/advice, etc. you may wish to offer re any of this.

iv. The Acting Assistant Director-General, Strategic Information and Technologies, Department of Education and the Arts) requested a copy of the CD-ROM from C. Marendy, (Acting Regional Technology Manager, Darling Downs-South West Queensland Region Education Queensland).

v. T. Otto to The Acting Assistant Director-General, Strategic Information and Technologies, Department of Education and the Arts (email): I believe you received a copy of the CD-ROM *ePortfolios: A learning tool* from Cos Marendy (Darling Downs-South-West Region). The ePortfolio Alliance was established and the CD-ROM produced as part of my PhD project (second doctorate), and I am writing to ask if you would please provide some comments about the material that I could include in my data. The ePortfolio Alliance has proven to be a very successful network as indicated in the attachment, and EQ has certainly had value for money in the professional learning that has been supported. The framework for the project has four phases: design; development; implementation; and institutionalisation (Bain, 1999). It has been running for two years and I am now very interested in the final phase. While ePortfolios is the topic for the project, the investigation is concerned with the application of a technology enhanced constructivist learning environment as an instructional design for professional learning and development. The production of the CD-ROM was only a product of the design. What is more important is the concept of a learning environment made up of the elements of: issue representation; information resources; case library; tools; and social and contextual support, which teachers can experience through their own learning, and then apply in their teaching. I am making representations at a district level for the design to be applied in other professional learning projects, but I am particularly interested in your comments about the potential for the design to be applied in state-wide professional learning. Thank you for your interest in our work, and I would be very happy to provide more information.

vi. C. Thistlethwaite to T. Otto: I am the Director of Teaching and Learning at a Primary School in Queensland. I emailed Elizabeth Hartnell-Young about an article I read regarding ePortfolios and she gave me your contact details. We are implementing a new learning management system next year and investigating the concept of digital portfolios. I am particularly looking to talk to schools using digital portfolios in Primary schools as a way of monitoring learning across their Primary years. Can you please email me if you are using portfolios so that I may be able to ask you some questions about the process. I appreciate this is a very busy time of year but I am interested in starting some dialogue that we may be able to continue next year or you could provide me with other avenues to investigate. I look forward to your feedback. (The CD-ROM and booklet was forwarded)

d. Teacher Access

i. T. Otto to N. Thorpe & H. Starr: The Science and Technology forum went quite well, and [T. Angus] did a great job. I was particularly pleased that five members of my staff did presentations (three on a separate technology project), as I believe it is a healthy sign for a school when it has an outward focus. There is a great deal to be gained when teachers document, speak about, and justify their thinking processes when putting together a project. Support for ePortfolios was strong with most sessions filled. A concern, though. An informal count indicated that far less than 20% of teachers had seen the CD in their schools. Brett Butler took 15 names and I am preparing CDs to send to him for forwarding, and I told others to contact me if they can't locate the CD back at school. It would appear that these teachers were keen enough to nominate, travel, and attend sessions on ePortfolios, yet principals have not passed on the resource we distributed. Any suggestions?

ii. N. Thorpe to T. Otto: As you are aware the CDs went to all schools and I sent an email asking principals to forward it to interested staff. If you want, as a follow up to the Forum, I could do a follow up with principals on this. Otherwise, it really is up to the principal and teachers who know about the CD to get it in the right hands in each school.

iii. T. Otto to N. Thorpe: Yes, probably little we can do except let people know it is out there. Perhaps it could be mentioned at principals' meetings.

Appendix F: *ePortfolio Project* Cases

1. Introduction

a. The teachers and school administrators who contributed to these cases were self-selected through their interest in developing and implementing ePortfolios in their schools.
b. Two teachers at Woodcrest State College and the principal at Pozieres State Primary School had implemented ePortfolios in their classrooms before the project commenced. They presented sessions at workshops as exemplars until local cases were generated through participation in the project.
c. A teacher at Gatton State Primary School and a teacher at Crow's Nest State P-10 School were early adopters of the concept of ePortfolios and developed frameworks at the beginning of the project.
d. Six schools received funding of $A2700 to support the development and sharing of ePortfolio frameworks. Teachers and administrators from four of the schools presented sessions at workshops, including Clifford Park State Special School and Helidon, Wilsonton, and Glenvale State Primary Schools. A teacher from the fifth school, Centenary Heights State High School, held an open day to demonstrate student use of ePortfolios.
e. The researcher was principal at Withcott State Primary School where a teacher and the teacher librarian developed ePortfolio frameworks.

2. Woodcrest College

A. Context

a. N Thorpe and T Otto attended a workshop on ePortfolios presented by two teachers at Woodcrest College in October, 2003.
b. Woodcrest College is a state school in a suburb of Brisbane catering for over 2200 students from the preparatory year to year twelve.

B. Workshop Presentation

a. Details
   i. The two teachers from Woodcrest presented a one hour session at the workshop in October, 2004.
   ii. T. Otto videoed the session and prepared the transcript in section b.
b. Session Transcript
   i. We wanted to make sure that computers were used in as many classrooms as possible. We wanted to make sure that computers were used as a way of linking all communities within the college families, not only teachers and students, but also to get the parents involved.
   ii. Instead of giving out a written report, we had organised for parents to come up and see examples of the children's work and then have a discussion with the teacher and the student and as a result of that develop an individual learning plan for each student. This then helped us form our assessment at the end of the year when we said OK, how far along the track have we gone to reach those goals. We had bits of paper everywhere and then a student would take it home to finish it off and they'd lose it, so [with digital portfolios] it would be safe.
   iii. Using computers is something that really gets a lot of students involved and interested. Digital portfolios are a good way of encouraging them and getting them excited.
   iv. We didn't have great technology skills at all and the concept of starting digital portfolios for every single student in the classroom was really daunting for us.
   v. Students just took ownership straight away and were happy to go ahead and organise themselves. The students were just so eager . . . and went much further than we probably would have envisaged at all. They were asking me to come to school early, at 7.00 in the

morning so that they could work on their portfolios. That alone, if everything else had not worked, just to have boys motivated, that was worthwhile.

vi. Our vision of a digital portfolio is a collection of a kid's work showing progress over time. So sometimes we put in things that were not always the pretty stuff, sometimes it was first attempts. So that we really have an idea of the journey the students have gone on and of course achievement has to be over time.

vii. We imagine we'd be a lot further down using video and audio then we ended up being. I imagined in particular that we'd be using audio and video a lot. But anything to do with electronics is [going to be an issue]. Somebody else is going to be using it; sometimes it's not going to work . . . So these frustrations that you come across, the bad news is it's not going to be solved easily. [Students] can sometimes come up with other solutions that we wouldn't come up with because we aren't as good as some in other areas.

viii. The thing with the hyperlinks when presenting to the parents it makes the whole process a lot easier. Getting them to reflect on what they are doing. Anything they put into their portfolio is a reflection on that. They aren't just doing a surface level. They are developing their language as well, which is powerful. It puts the pressure on the students but in a good way for they're learning in front of their parents too.

ix. The idea of the digital portfolio is that the students work on the portfolio throughout the year. In the middle of the year there is an interview with the parents through the digital portfolio with their learning. It actually puts the onus back on the students with their learning. You can hand over to the students to lead that presentation. The students rather than just the teacher. That is a really interesting time because it is around the half way mark of the year that the students should realise where it is they are going and what we expect of them. That is important for them.

x. There is a real purpose for learning. I chose to do my portfolio in HyperStudio. It is similar to PowerPoint. My students were using HyperStudio a lot in the classroom. We talked about the idea of portfolios and where they wanted to go was HyperStudio Stack. There was real purpose for using work samples.

xi. It also gave them an opportunity to share with their parents. When students start to reach high school or middle school we actually have a reducing number of parents attending interviews. We have portfolio meetings and 90% of parents turn up. The students were very disappointed if their parents didn't turn up so we tried to burn their work to CD and the parents would use that at home. A father of a student in my class came up to see teachers for the first time. The student presented his work and his dad said he was proud of him. You think you know what is going to come out of these things but it is often amazing.

xii. The key of digital portfolios it is a celebration of learning. Students letting their parents know what they have been learning. It is often the case that parent interviews involve report cards. Parents have come in and probably never given their children praise in their life. Students have put so much effort into it. What they have done rather than trying to compare it is something you can't really compare there is no standard or benchmark for them. It also takes responsibility for their learning. Kids wanting to get their work done and staying in at lunch time. Take pride in their work so they felt valued as well.

xiii. Technology always gets them in and the nice thing is because they tend to know more than we do. Always try to choose experts who are the lower level learners. Expert in some area of the classroom is really nice, too.

xiv. Because everyone was doing independent work and so focused on new pathways and gave us something worthy to show.

xv. The less able students develop more independence and it gives your able students time to give them some focus and not just marking time.

xvi. Everyone can learn more because everyone in the class actually becomes an expert.

xvii. There are more opportunities to learn about a variety of things. To reflect on their knowledge and their learning is almost like extracting teeth.

xviii. The parents see their children's work from their children's perspective. It is also less confronting. They are able to join in discussions, share in students' pride of their work, and it is a focus and starting point for discussion.

xix. Even though interviews are lengthy, they are very important to provide a source of communication. The student and parent share the Digital Portfolio together while the teacher can start the second phase of talking to another parent and developing their plan. This process helps to improve the parent/teacher and student/teacher relationship.

xx. Digital Portfolios are valuable for all students, from Special Needs students to high achievers. Many different genres can be used to suit each student.

xxi. Students gain confidence and a powerful experience by explaining their work. It helps crystallise in their mind the purpose for doing things.

xxii. Assists students to engage in learning and improves self esteem.
xxiii. Students reflect on their experience of learning and appreciate visual literacy.
xxiv. Students have the opportunity to include pieces of their choice.
xxv. Students can demonstrate their reading strategies.
xxvi. Students take ownership of photographing events, excursions or activities and this assists recount.
xxvii. Assists teachers with students' anecdotal records including awareness or lack of awareness of punctuation and recount genre.
xxviii. The teacher develops a template which allows for both assessment and purpose for completion.
xxix. The teacher can provide help page with hints, links, outline, and fonts to assist students with independent learning.
xxx. It develops positive sense of self, responsible citizenship, gaining & organising information from all sources, and reflections on success.
xxxi. Digital Portfolios gives students a choice of working out how the best way of operating is.
xxxii. Digital Portfolios give students a purpose to get information that is worthwhile.
xxxiii. Teachers find that the whole learning process is enhanced by Digital Portfolios.
xxxiv. Teachers embed computers as part of student learning and are not taught as a separate subject.
xxxv. Teachers work co-operatively to allow all classes and students to access computers.

c. T. Otto Thanks Presenters
   i. Thanks to our presenters. It is one thing to talk about doing Digital Portfolios and another to put it into action. You've shown us today the reality, a lot of hard work, a lot of learning, perhaps going down different paths. We've heard today of the rewards of Digital Portfolios, what the parents have said, how it works for children, the reflection that you've encouraged and we've heard that come through today.

3. Pozieres State Primary School

A. Context

a. A. Fenney, principal of Pozieres, had implemented ePortfolios in his classroom for several years before the commencement of the project.
b. The following information was provided in the survey responses (see section D).
   i. Pozieres is a small rural primary school with 15 students.
   ii. The Pozieres District is a fruit, vegetable, and grazing area situated 20km north-west of Stanthorpe. The small, stable community is multi-cultural, with the predominant culture being Italian.
   iii. The school offers an inclusive primary curriculum program catering for a wide range of abilities with a variety of choices within subject areas. Extra curricular offerings include sport, eisteddfods, art, and extended learning programs. The children come from families with strong traditional values and occasionally from itinerant workers.
   iv. Pozieres is staffed by a teaching principal, two teacher aides, and an administrative assistant.
   v. The school has a multi-age class and a teacher is employed one day each week to teach years 1-3. Teachers are progressively integrating learning technology into the school curriculum. There is a 1 to 4 ratio of computers to students.

B. Workshop

a. Details
   i. A. Fenney presented a one hour session at the workshop in July, 2004. Sections b-j are a summary of his PowerPoint notes.
b. What is a portfolio?
   i. A purposeful collection of students' work that illustrates efforts, progress, and achievement.
c. Why use portfolios?
   i. They provide a richer picture of student performance than can be gained from traditional, objective forms of assessment.
d. What is an electronic portfolio?
   i. Allows students and teachers to collect and organise portfolio artefacts in many media types (audio, video, graphics, text) using hypertext links to organise the material, connecting evidence to appropriate standards.
   ii. An electronic portfolio contains artefacts that may be in analog form, such as a video tape, or may be in computer-readable form. A digital portfolio contains artefacts that have been transformed into computer-readable form (digitised/scanned/input).
   iii. A portfolio is not merely a collection of course projects, assignments, videotapes and pictures designed to impress someone. If it is to meet full potential, a portfolio must be organised, goal-

driven, performance-based evidence that indicates the learning outcomes, skills, values and attitudes of the student.

e. Types of portfolios
   i. Working portfolios: An intentional collection of work guided by learning objectives.
   ii. Best work portfolios: Demonstrate the highest level of achievement, a celebration of learning.
   iii. Assessment portfolios: To document student learning on specific curriculum outcomes.

f. Benefits of digital portfolios
   i. Work in many media is accessible, portable, examinable, and widely distributable.
   ii. Performances are replayable and reviewable, can see more than once.
   iii. Ability to present a wide variety of forms of evidence, linked for easy access.
   iv. Evidence can be shown to be authentic.
   v. Increases skills and knowledge of multimedia production and its use.
   vi. Students and teacher work together on meaningful activity rich tasks.
   vii. Increases confidence of teachers in implementing technology.
   viii. Enhances the "learning organisation": students and teachers learn together when all create portfolios.

g. Selection and reflection
   i. Students and teachers examine what to collect to decide what should be included in the digital portfolio.
   ii. Work samples should reflect the learning outcomes of the curriculum.
   iii. Reflection is critical. Unfortunately this is where many digital portfolios end. "The use of digital portfolios not only helps students make better progress on the skills in the curriculum; it also helps them develop critical skills such as reflection and self-evaluation which are fundamental to excellence in any walk of life." Helps students articulate their thinking about each piece in their portfolio. Through this process of reflection, students become increasingly aware of themselves as learners. Helps students to look ahead and set goals for the future. Students see patterns in their work. These observations can help identify goals for their future learning.

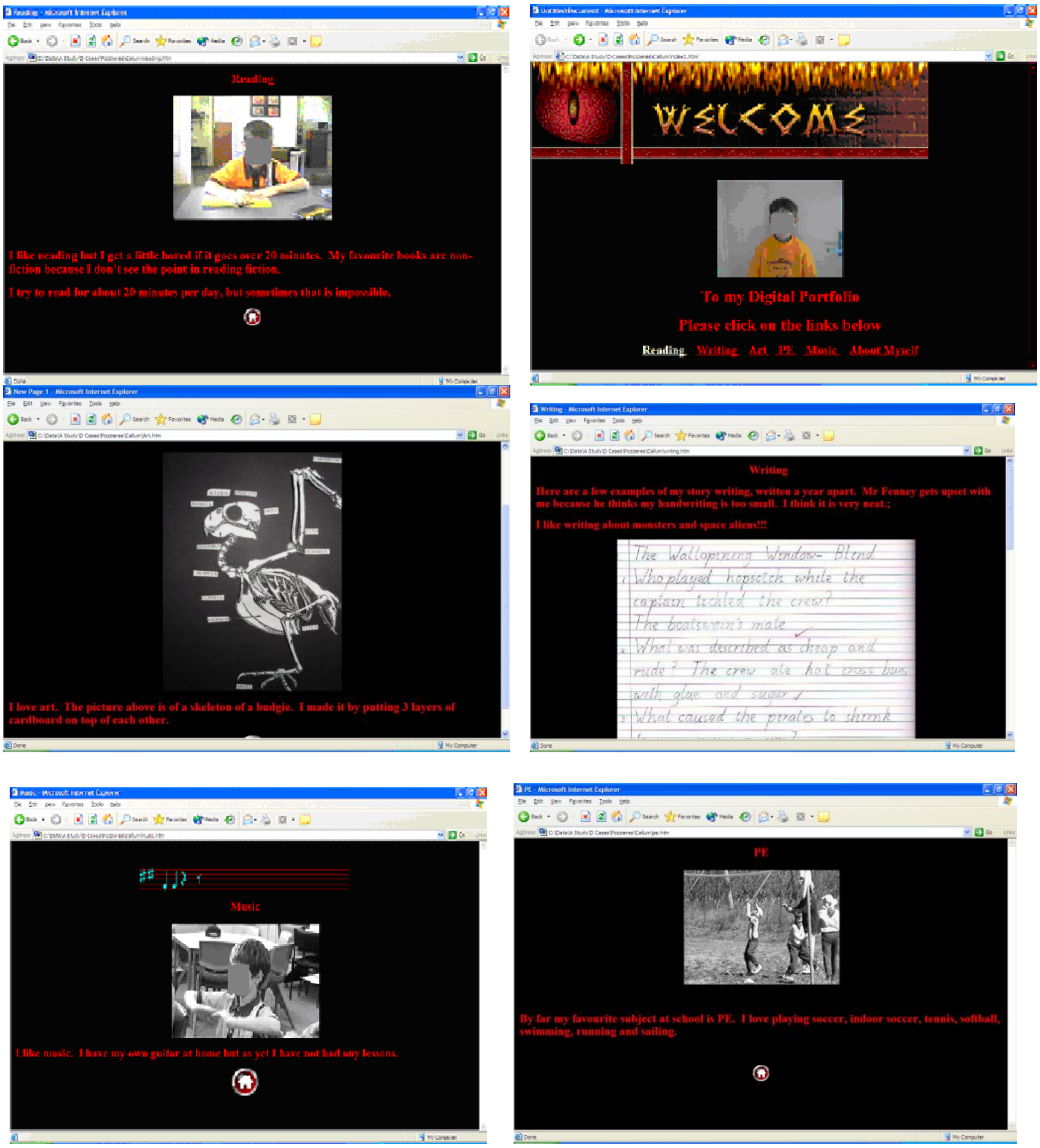
h. Defining the portfolio context & goals
   i. Identify the purpose of the portfolio.
   ii. Identify learner outcomes.
   iii. Identify resources available, hardware and software, PD requirements.
   iv. Assess the technology skills of students and teachers.
   v. Identify audience for the portfolio.

i. Levels of digital portfolio development based on ease of use.
   i. All documents are in paper format.
   ii. All documents are in digital formats, using commonly used software (word processing) and stored in electronic folders on a hard drive, zip or floppy disk.
   iii. Portfolio data is entered into a structured format, such as a database or Hyper Studio template or slide show (PowerPoint, AppleWorks) and stored on a hard drive, zip or floppy disk.
   iv. Documents are translated into .html using hyperlinks between pages, using a web authoring program (FrontPage, HelpScribble, Macromedia) and posted on a web site, saved on a CD/RW or imported into software for managing teaching and learning (KidMap, SchoolMate).
   v. Portfolio is organised with a multimedia authoring program, incorporating digital sound and video, then converted to digital format and burnt to CD/RW or imported into KidMap or other suitable software.

j. Equipment & cost
   i. Digital camera $A300-$A500
   ii. Digital video $A1000
   iii. Scanner $A100-$A250
   iv. PowerPoint, FrontPage Express, HyperCard & MacroMedia are free to schools
   v. KidMap or SchoolMate is optional for managing teaching and learning $A1000.

k. Sample ePortfolio
   i. Figure F.1 is a sample of an ePortfolio created with FrontPage.

Figure F.1: Pozieres State Primary School Sample ePortfolio



C. Survey Responses August, 2005

a. Details

   i. A survey (see appendix C.1) was emailed to A. Fenney (principal) and responses were returned by email.

b. Survey responses

   i. Purposes for ePortfolios: To provide a way for our students to demonstrate evidence of achievement against the key elements of the KLA's over time. The results will be shared with the Education Queensland. Pozieres Student Digital Portfolios have evolved as a unique aspect of our ICT Integration Program. They are used to assist our students in telling their own story, an account of their work and performance that is broad, deep, and coherent, as well as being accessible both to those most immediately involved with the school and to our community. In accomplishing this, the Student Digital Portfolio also provides a strategy for a professional community's sustaining inquiry into its own work, and a continuing focus upon the critical concern of that community, that is, student learning, progress and achievement and to the daily work of a school as a learning community. As our Student Digital Portfolios endeavour to achieve an accurate representation of the work and performance of our school, it is therefore an expression of our school's accountability. Not only our public accountability to our students, parents, community, school district, and the state, but also our professional accountability to teachers, administrators, and others within the wider education community.

ii. Types of ePortfolios: A combination of summative and formative with an emphasis on the latter.
iii. Hardware used: digital video, digital camera, video camera, scanner, DVD burners, CD writers. Computers with a least 80GB and 556 MB Ram.
iv. Hardware procurement: All equipment was purchased using the school grant and the ICT Innovation Scheme. The original non-digital video camera was connected to the computer via a small $A100 hub.
v. Hardware use: No problems.
vi. Software for collection: FrontPage 2000. All schools have this software and is therefore transferable between schools. Movie Maker 2 is a free download from the Internet. Photo software such as ULead 7 and Video Presenter.
vii. ePortfolio structure: Via the KLA's, i.e., a home page with all the buttons navigating to the relevant pages. We keep it very, very simple because we expect all year levels to use them.
viii. Software for artefacts: As above, plus PowerPoint and Word. This software is available in all schools and is very easy for the children to use. Also by using this software their ICT skills are increased.
ix. Items included: All KLA areas, hobbies, social pages, and favourite pages.
x. Changes: Yes. We now are able to put the outcomes on the student's work via buttons appearing on their work. This was done using Flash files which we downloaded and adapted with permission from an Internet site in Melbourne.
xi. Training and assistance for teachers: No training. Just spend time fiddling with various software and then pass knowledge on.
xii. Training and assistance for children: I showed year seven children how to use the software and they show the rest of the year levels.
xiii. Viewers: Parents, teachers, Executive Director (Warwick Education District) and other Education Queensland staff. Parents sit at my office computer to look at the Portfolios which are imported into KidMap. All work is store on CDs. However, to save storage space they will be stored on DVDs by the end of the year. Class computers are linked to my computer so I can pull off whatever I need. Parents look at the Portfolios twice a year. They are updated during the end of semester vacations.
xiv. Management issues: Because of lack of funding in the school we have been creative in how we make things happen. For example, Flash is extremely difficult to use. I came across a web site doing what I wanted to do. I contacted the ICT section of Central Office and asked an adviser to look at the site and tell me how it was done. She contacted the company concerned, obtained the files from them and worked out how to change the programming script so we could use it at no cost to the school.
xv. Changes: Our assessment and evaluation processes have become more real, "warts and all." We can foresee a time when we will not use written reports. Criteria sheets can be adapted easily into this process. The expectation of good work has permeated throughout all subject areas as this work may be displayed in the students' portfolios. All work is considered to be a potential rich task.
xvi. Conversations: Digital Portfolios have become a norm in our school and are now seen as normal practice. Parents particularly like to see where their children have come from.
xvii. Influential examples from other schools: Sorry, this sounds egotistical, but none.
xviii. Sharing: Via conferences, school visits both on and off site, and workshops.
xix. Future development: An influx of money so that we can increase our computer ratio to students and update them generally.

4. Gatton State Primary School

A. Context

a. D. Hacker, a teacher at Gatton, had been released from some teaching duties in 2004 to develop an ePortfolio framework with his class.
b. Gatton is located 100 km west of Brisbane in a provincial town of 8000 people. The school has a growing enrolment of 850 students from preschool to year seven.

B. Workshop

a. Details
   i. D. Hacker presented a session at the workshop in October, 2004.
   ii. T. Otto videoed the session and prepared the transcript in section b.
b. Transcript of the Session
   i. These teachers are extremely dedicated people. Must put in a lot of effort. Look at the time aspect. I teach grade 6 at Gatton this year and I have been give a couple of hours a week to

coordinate the digital portfolios that are going on in year six/seven. There are a hundred and twenty-five students and I help to coordinate portfolios.

ii. Our school actually runs PowerPoint presentation from year three. Pretty well keyed up on most aspect of using PowerPoint. The teachers I work with are really keen and want to do a lot with it and once the teachers really get into it. Thanks to Tom for getting us into it.

iii. Teachers at the other end have said, "Well you want to do digital portfolio. You're going to have to take it and you're going to have to organize everything in it." And I accept that I said that I think all teachers are different. So many interruptions in the Year 6/7 area and I think you've got to work out in your own mind how you're going to run that.

iv. What we've done at Gatton, we came from a different angle. From our yearly survey computers suck to we don't have enough of it, which is total rubbish. They have computers in the lab, computers in the room. Being year seven's, computers suck because you don't let us play games on them. Basically that's what they were saying. And also the skill level of some of the kids were pretty low so our digital portfolio, the purpose of it, would be to increase the skills of the kids using the standard cameras, video cameras and things like that, knowing the sites that are useful and putting on midi files, all those sorts of things.

v. So our digital portfolios are very much process-based. We weren't doing them so you could have an interview with them. We did say to the kids, "Yes there might be some that you go and show grandma or your aunties that this is what we do at school." I reflect back that this is what you might have done at school. You most probably did this in your last year at school.

vi. So you'd have a little book in which you would put things that you've got to sign in. Get them to personalize it in there - you might have a table of contents, statistics about themselves. If the kids were interested in horses, their cats, singers and things like that and you'd also have things that you did at school. That's where I think your projects can come in. This is what you most probably would have done prior to the digital revolution. You'd have your awards.

vii. We are going the right way with what we're doing when I see the way that Tom and others are talking. And then, you'd have some photos in the back of some experiences that happened that year. So basically you've got a scrapbook, a collection of things that shows what happened to you in the last year at Gatton School.

viii. Now I know there are other portfolio definitions where people think, "this is their work, it has to be purposeful." I must admit some of this is not purposeful but the reason was we wanted the kids to actually experience using digital cameras, being able to put things on to portfolios. And most importantly, it was theirs. We didn't want, "Hey kids. This is the list, the criteria sheet. You must pass this to be able to pass portfolio." We wanted it to be fun.

ix. At the beginning I showed them what I thought they might come up with. And I also gave them this book. I think it is important that you actually scaffold for the kids. If you just come up with, "We're going to do this digital portfolio and it's going to have this and it's going to have that." They don't know where to go to. So we gave them this book and in a moment you'll be able to see where it comes from.

x. It would have a title; it's sort of a way of going from there to there. And it's a way of having a person's stuff and then on the back of each of these sections we put a put a blank sheet of paper so the kids could actually work out roughly what they wanted to do in their portfolios. The things is, we also had it set up with most of the hyperlinks already there because I think initially the kids need to know how hyperlinks work and if they're already there, you've got a chance of showing them. And then they are able to expand it. This of course is only the skeleton and we expect them to be able to just blossom it out.

xi. Because it came down to the timelines - because how do you actually get the time to do this? I was lucky enough to be able to go to classes and I'd do a specific lesson. Say we wanted them to be able to put something using the video camera so I'd take small groups out. We'd go through the video camera, do an activity with it, leave the camera in the room, so that everyone had a chance to be able to use it.

xii. So of course once you start doing lots of video camera and all this sort of stuff, the megabytes start getting eaten up in your servers and things like that. You've got to balance it out because if you've got 120 kids doing it, and I must admit that I haven't got 120 kids that are whiz-bang. I've got a small group that are up here and I've still got those down here that have absolutely no idea, doesn't matter what you do. Every time I'd walk in the door, "Can I go with you?" because they'd know that you'd go out and do something but the actual compiling it back into the digital portfolio hasn't quite worked. It is very important, as I've said, that the kids should own it. If the kids own it I think that half the battle is over. It's not something that "he" wants us to do, especially if they have been given the opportunity to design their own.

xiii. In a moment too, I'll show you some where kids may be doing inappropriate things and I think you've got to work out in your own mind how you're going to handle that situation and how you've got to try and get them to be self-critical about what they're doing.

xiv. Portfolio Demonstration This is the demonstration that I use to begin with. I made one up about myself. I've taken from bits of what other kids have done. A kid had a soccer ball thing so I've just done something like that. You can use all your techniques that you can use with PowerPoint. See if it works. This is one of the problems that we had. At the school we went and bought Kodak cameras. We had big trouble. We had to go and find a version of Quick Time to make him run but that was actually a video of everyone. Everyone at athletics took a video of themselves doing that. There is actually a song there, their songs and things like that, their hobbies, so we're using sound and all those sorts of things.

xv. When they set something up for Anlezark who was our hero for the Olympic games, so that might be a book week entry. They had to make a Knock Knock joke, it was through the door ways or whatever it was this time. This was where we have thumbnails, so just click on them again. That was sort of a rough idea of what we're aiming at doing. I'll just show you what some of the kids of done. These aren't finished but it's just worth having a bit of a look at them. We're at the point now where we've got to go and talk to the kids.

xvi. We've got one fellow who's an autistic boy who's got thousands and thousands of pages of trains. He comes to every one of my sessions and that's all he's ever interested in is trains.

xvii. She's gone and dragged a lot of stuff in but I think she's ended up with quite a presentable product there hasn't she? And her family's very interesting. Actually the Munster's music should come on but for some reason it's not coming on. She actually has the Munster's music as a midi file put on there and if you see her family, you'll know why. Look at what she says about boring sports. "I can never get the concept of why I have to stand on the oval just to throw a ball around the yard. I'd rather be doing art." I think that shows her thoughts and she most probably hasn't expressed very openly to other people but she's been able to do it there. Other kids check each other's portfolios out all the time.

xviii. Here is another student who turns up every day. Because of the way we've got duty I actually open the computer lab three lunch hours a week and the kids can come if they want to. She's one of the regulars and she spends most of the time mucking around like this. Sounds like this. Now a lot may not be very purposeful. Everything is sort of "fab" and "wayout" and all that sort of stuff. Also I have learnt a lot of beings that I never knew. I didn't know who Fifty Cents was. And don't ever let them put in Enimem, a lot of things aren't very appropriate. She's got that one very good picture. A lot of them have changed these icons to personalise them. At the moment we've left all those sorts of things in because we're at the stage where we're asking the kids to go and reflect on what they've got. The boy with a thousand pictures of trains, Eloise (pseudonym) with Bart. That's sort of Eloise. She thinks that's wonderful. Every time I talk to her about that "We should get rid of that" she'll go and hide it on me and then I'll find it later on. She's gone and put it back. But I think, for a lot of you, "Off the net, can you go and get me an animated gif?" A lot of people wouldn't be able to do it. So there is a skill base involved in that and if you think of the process, I think you can see that "yes" she is doing some learning. She's also very mature. This was only half way through the year. At the moment she's got all these muscle pictures of boys and things like that and I think that those sort of things help, when she's talking to us, especially the couple of lady teachers who have got the year sevens; very close to their kids; and when they're actually talking/discussing these things, it's a bit different if the teacher comes up and says "you got to keep away from those boys. They're going to cause you problems later on Eloise." But at least if she's showing her portfolio there . . . why did you get that? Some of the ladies who are on staff are very good at discussing safety for later on so that you don't have them as pregnant school girls later - it's an easy way of breaking in to all those sorts of levels as well.

xix. There are two ends as Tom was saying - the traditional and constructive. That there's nice things, yes, but I don't think that Bart dropping his pants is very good for showing to Mum and Dad on Interview Day but that wasn't our purpose.

xx. But I think also before you dive into digital portfolios, which I think are wonderful, try to work out exactly in your mind what it is you're trying to get to. Allow a lot of freedom for the kids as well. I think if they can take over , initially if you're going to do it in the lower end of the school you wouldn't allow them as much as freedom, but as they going to get older, they're going to do things like that. They're going to put Bart on dropping his pants. They're going to put on inappropriate things. They need to be able to feel safe doing that and then to reflect what they've done.

xxi. And it's important when I look around the room; I'm sort of getting to the end of my teaching career and what worries me is the number of younger teachers coming up, and I'm looking around the room here, there's going to a lot of people retiring in say the next ten years, and I do hope that we can at least enthuse or get the younger teachers coming along who will actually keep these sort of things going. To them, they don't think these things are so "wow" and frightening. They're going to get in and have a go. And I think if we could all have a go at it. Because I must be one of the few teachers in the school who wears golf socks and shorts, that's how boring I am, but if you really get into it and enjoy your kids doing it . . . don't get hung up on "This has got to be this thing that is going to be polished and it's got to look lovely." It's got to be the kids. It's got to reflect the kids. They've got to enjoy doing it.

c. T. Otto thanks D. Hacker
   i. There was a message there we heard from [the Woodcrest teachers] and it has really come through from what Dave had to say there and if I can put it up in big letters right across the room, "What do digital portfolios do? It changes the conversation between teachers and students." It changes the way we talk to students, what we talk about and I think that came through very clearly in yours as well and also the conversation of course between teachers and parents. So in big letters, it changes the conversation and automatically without even going to too much trouble, we automatically go about our job differently. It changes the way we do what we do. I say, you know this very simple idea, it's no rocket science, I said at the beginning, there's nothing terribly clever, it's just collecting things digitally but look at all the implications that come from it. I think that's gone out very much there from what David said. Thank you David for sharing your work at Gatton, we're very pleased to hear about it.

5: Crow's Nest State P-10 School

A. Context

a. B. Butler, teacher and ICT Co-ordinator at Crow's Nest, attended the inaugural meeting of the Digital Portfolio Network in May, 2004 at Withcott. He was motivated by the concepts discussed at the meeting, and over the next few weeks used his skills in ICTs to create and implement an ePortfolio framework that suited his needs.
b. Crow's Nest is a rural school catering for 430 students from preschool to year ten.

B. Interview with B. Butler

a. Details
   i. T. Otto interviewed B. Butler in August, 2004 at 12.15 p.m. during his non-contact time in the Crow's Nest State School computer lab. Examples of ePortfolios were viewed during the interview, as well as a presentation being developed by B. Butler to share with teachers and school administrators.
b. Interview Transcript
   i. B. Butler: There may or may not be students coming in, hopefully not. What we have done is we've placed the folios on to G drive which is accessible to all the teachers and students at the school. There are some issues with access as in people can access and change things. However, we haven't had any problems, but I have spoken to our IT person down in the office about the possibility of changing access rights like read access, write access, and having certain files only as read, or whatever, to different people. I don't know how that will go, but at the moment we haven't had any major issues. We have just done it on G drive and then the digital portfolio's folder.
   ii. T. Otto: Do you have an SOE build on your server [Standard Operating Environment for Education Queensland]
   iii. B. Butler: Yes. From there we have got all the students with their own folder. Within each student folder they actually have a number of pages, and the first page in most cases is indexed in .html convention for the Internet so that in the future if we were to look at placing it on the Internet, perhaps, it is a possibility that at least we can do it. If we double click on that one and bring up an example, some of them have music. This is [student's] portfolio. It's got a bit of music going with it. Found the text from the Internet from some good sites, those sorts of things, and he's structured his differently to other people. But he has basically gone through and he's got an assessment section, and he's got his subjects with his assessments, examples there, and he can move through like English, and he can go through the structure. The first thing I did after I went to the first portfolio meeting that night, for about four or five hours and I did up an example of a digital portfolio.
   iv. T. Otto: Did you go to the Withcott one?
   v. B. Butler: Yes, the Withcott one it was, after that. It was the first meeting I went to and I thought the idea was good, has potential, and I'm a pretty lateral thinker as you'll see as we go along. You will see as we go. If I have a good idea I'll have a bit of an investigation. So that night I went on the net, picked out a couple of the examples and I thought they were very poor, to be honest on the net. But at the same time they have restrictions on the Internet with speed, so I can understand why they are fairly plain. But what I thought was poor in them was the fact that there was little, ummm we started to put in reflection, with context improvements, good points, what's excluded, those sorts of things and so that's the sort of stuff we'll start

adding now. We're in the process and an outcomes column so we can put in whether it be a grade mark or whether it be a specific learning outcome, which is where we are trying to move to at the moment. But if you click on a work example it comes up and you can read it, and that goes through with Word, it can be a .jpeg, some of them are scanned documents which are .jpeg documents, others are video, those sorts of things as well. We use MS Movie Player, Movie Magatory and it's quite good. We might use it to produce some of the movies. We use just a standard digital camera so it's not too large and edit from there. But anyway that is an example of one of those work samples.

vi. T. Otto: Can it bring together the skills that the children already have or are children learning new skills because of it?

vii. B. Butler: Well, it's been a little bit of both. We had looked at web page design before we went into this, that's why it's just a perfect application to move to this as the next step. The kids had some good solid skills in web page design, and I can see it's a really motivating task as far as it had a really good practical application and they've really come up with some excellent looking folios. We've got a variety here and they've really come up very well. Yes, there's just such a variety. I've had on a number of occasions students wanting to stay at lunchtime and I'm helping them to do more. They're just very motivated for it. Today we just started the new bunch of year eights. I just showed them how to do basic heading and explained how it is very similar to a word processor except for the fact that there is no restrictions in width, and no restrictions in length. Started with a heading, showed them how to put in effects so that when you move the mouse over it changes, clean pictures and that sort of stuff. And that was enough to know so that they want to stay, have a play if they want to get further.

viii. T. Otto: With your experience with primary, how far down would you go with this?

ix. B. Butler: I'm actually off this Friday, starting with a couple of non-contacts to help one of the primary staff, year five. I think that from my personal experience in primary school I have taught down to preschool for a short period of time to get a bit of a feel for what they are like. I think probably year three, that is my gut feeling, if they could start and manage their own work from about year three on.

x. T. Otto: A lot of people say no, that is too low.

xi. B. Butler: I think even year one could do it if you had someone who had a bit of skill. I think you need to have a staff member who is relatively skilled to do it and have a lot of patience. You need quite a special kind of person to do that. I think it is possible, even preschool, but that really is more difficult because it is movement with the mouse and all that sort of stuff that you are competing against. So you can use this, you can go back to the main page or back to the assessment page. It's got two separate links, and you can move around within there. In my computing class they started to put reflections underneath each one. I explained and showed them how to insert a new row, which comes up with all the columns, and I just showed them the technique to merge so they could write in their reflections. I haven't really gone through them. I haven't had a chance. As you can imagine I am very busy at the moment. So you can go through any of those examples, for instance the rainfall chart. That's an excel file. Looks fairly simple but what he's done is that he has used conditional formatting so that if something is equal to between certain amounts it has a certain colour, and that's the code there and those sorts of things, and you've got comments, a lot of people don't use those, comments to show what it means. He's done a good job and he's used formulas and whatever in it, too. It comes up well.

xii. T. Otto: Where would he get that assignment from?

xiii. B. Butler: He would have done that assignment. He would have saved it on his home space. As I've taught all the kids they need to then, because of the way I've structured it, and depending on if you've structured it in a different way you do a different thing, but in this situation he cuts it from his home space and he pastes it to his portfolio folder on G drive.

xiv. T. Otto: Is this an assignment from another teacher or from you? Are these all your assignments?

xv. B. Butler: No not all of them. A majority are because I'm fairly into it and I tend to be fairly computer oriented anyway. We have just started, in all my classes I have made it compulsory to do electronic submission. It doesn't disadvantage anyone because they've got access to scanners, they either submit it to G drive on a specific location they know about as a file, which I prefer if they can, or if it is handwritten, or whatever, I get it and I scan it or they'll scan it as a JPEG and then they can submit it there. I mark it and then after that they can obviously move it back to their portfolio straight away. It's not as big a hassle.

xvi. T. Otto: Are you marking them electronically?

xvii. B. Butler: No, not normally. I don't think it's efficient. I'm not doing this to be smart, I'm doing it because I think it can work and it can be efficient once you get the structure running.

So yes, I have done a little bit of stuff but not all, I've done some voice marking, I've done comments, I have used say, Paint, or something like that and I've circled a word and put in a little arrow, but it's just not worth it.

xviii. T. Otto: In Word they've got 'comments' and 'paste in comments.'

xix. B. Butler: No, I haven't used that, no. But that's basically the structure I've been using, and it gives you a fair idea.

xx. T. Otto: Is there any talk about or move to giving the assignments electronically?

xxi. B. Butler: I'll just show you mine. I've got a site, a teaching site for all the students to use. I've got a short cut so it's quick and easy if they're not very literate. So we'll double click on that one, the short cut, brings up my teaching site. So, it says welcome, and this has got all the resources they need for the learning in my classes, everything's there, assessment, and that's all the criteria sheets, all of them for all the subjects, all electronic, all online, all within the school Intranet, learning links, everything to do with learning for every subject and there's different resources for teachers, students and then parents. Not that they would probably come in on G drive as we are doing as we go. I've also got a link to the year book. So what I've done also is I've got a fair bit of fancy stuff. I tried to make this as motivating as possible for the kids, at their age, as we can do. There's also tab over the side here pops out, a bit of Java scripting, it was just a matter of finding a place on the Internet where the Java scripting code can be found, it actually goes into detail of what you can do with it. Just do it and modify it but it's got all the major links of design with digital portfolios and web page stuff.

xxii. T. Otto: Have you thought about online discussion and email?

xxiii. B. Butler: Not online discussion, that's not necessary on a campus of this size, and I don't know how to do it. I'd be interested. I've tried to make this as user friendly as possible, to the point where it's got hot keys. For example, just press A for assessment. It's got all the assessment, what I'm looking for in an A, B, and C. At the moment there is not a great consistency in assessment. We are moving toward it. Teachers may log on to one of my criteria sheets and save it to their drive, modify it and use it. Beautiful. That's what it's all about. Let's look at English. Got my criteria sheet for that as well. With any genre based work I've added an explanation sheet as well. Critical literacy. What did I do to present it? How could I have done it differently? What could I've done to improve it? And they've got to go through and answer that as part of their assessment. I'll show you an example of the electronic submission that goes with that.

xxiv. T. Otto: Are you networking with other people, or are you creating this for yourself?

xxv. B. Butler: Just myself.

xxvi. T. Otto: Have you created problems on your G drive?

xxvii. B. Butler: Not yet. I've done a fair bit of video. I did have a problem with drive space, which I dealt with immediately by cleaning old material from the drive. I'd love to see a bigger server because there are so many things I can think of doing if we had the space. I have mainly removed movies that were not curriculum based. I try to motivate the kids by giving them a bit of freedom. . . . I've had to resize pictures and turn them into JPEG to save space. If I had it on the server that's a skill I'd like all kids to do. Teach the skill and then they'd be able to do it. We need to be selective about video. We can't afford duplication and I've made it a rule that it must be cut and not copied if moving from H to G drive.

xxviii. T. Otto: Barry Dittman at Toowoomba State High talks about keeping the latest and greatest, say no more than about eight items.

xxix. B. Butler: Depends on driver space. I'm thinking about this as a long term thing, but I can see where he's coming from. If you are running a big school you are cramped for storage space. In the situation I'm in at the moment, I believe there is space on the server, but if I can't, I won't.

xxx. T. Otto: Can you see the children starting year five and their work being there through to year ten?

xxxi. B. Butler: Sure, take the best. There are a number of alternatives, but I'd make the best decision with the information on hand. . . . Students need a bit of input of their own personality. This student's using a lot of initiative, although he's got this annoying picture page. This isn't related directly to the curriculum, sure, but as a motivational tool, see you click on the picture and they fly off, they annoy you.

xxxii. T. Otto: What other things can the children totally choose themselves to do?

xxxiii. B. Butler: I said at the start, this is how it is going to work. You are going to have some assessment things and some personal things. That's an optional thing, but I'm more than happy for you to design your own style in your own way, and I'm going to give you a proforma of what you may want to do. As long as it is not ridiculous with the amount of things they want to put in. All the movies are in the one file and they don't move. If they move the links break, and they have to be careful about linking to the right location. The other thing the students use a lot is learning links. Press "L." So I can find year ten computing, here, A Good

Site for Images, so off I go. Saves wasting time on Google, and let's face it, the Internet is slow. So they can find the links they need, maths, and so on, teacher resources, student resources, some PD. We have done some work on behaviour management so I've made sure it's available on G drive. A mini website, technology use, general documents, performance objectives, cognitive strategies.

xxxiv. T. Otto: Have you thought about the instructional design of your work, because you are using many elements of a particular instructional design, and you are using it intuitively?

xxxv. B. Butler: Yes, I'm using logic.

xxxvi. T. Otto: If you looked at constructivist learning you'd find you are using a lot of the things that Jonassen is talking about, issues, resources, cases . . .

xxxvii. B. Butler: Yes, that's what I'm looking at next [cases].

xxxviii. T. Otto: That's why I asked about communication tools, because collaboration is part of it, and the other thing is learning tools, for example, templates.

xxxix. B. Butler: Well, I'm making templates.

xl. T. Otto: If you look up Jonassen or constructivist learning environments on Google that will give you the theory behind what you are doing intuitively.

xli. B. Butler: Those things you are talking about, if I haven't already done it I'm taking steps to do it.

C. A Resource to Support Professional Learning

a. Details
   i. B. Butler created a CD-ROM of examples, guides, and skill building exercises for teachers interested in his work. Sections b-g are a summary of the content of the CD-ROM.
   ii. Permission was granted for the contents of this CD-ROM to be copied along with other resources relating to ePortfolios on to a CD-ROM for distribution to all schools in the Toowoomba and The Downs Education Districts.

b. Benefits of Digital Portfolios
   i. Inclusion of multimedia (video and audio) at the touch of a button.
   ii. Extremely motivating for students.
   iii. Students take greater responsibility for their own learning.
   iv. Digital portfolios can be used at teacher interviews. Work samples at your disposal at the touch of button and therefore less juggling of paperwork.
   v. Students learn important IT skills and apply them for a real life purpose.
   vi. Allows teachers to more easily track student progress over time.
   vii. Portfolios can be burnt onto CD and transferred easily to other school[s].
   viii. Increases the relevance and intellectual rigor of student learning by including work sample context and student learning reflection.

c. Possible Digital Portfolio Difficulties
   i. Storage space.
   ii. Lacking required resources to create specific work samples. For example not having a scanner to scan student work.
   iii. Broken links - if students move their work samples or rename them after they have been hyperlinked in their portfolio their links won't work (Click here for a video example of a broken link and an explanation of how they occur and how they can be repaired 4:29).
   iv. Time restrictions.
   v. However, Digital portfolios are a rich task where students could be allocated time each week to develop them and to ensure their currency. Digital portfolios are the perfect application of IT skills in a real life context.

d. Student Digital Portfolios & Learning Outcomes
   i. The "De Jargonator" was created to "link student work samples directly to an outcome explanation; as a resource to find outcome information related to teacher planning (outcomes can be copied and pasted into teacher planning); and to allow students and parents to understand the meaning behind the jargon."
   ii. A video link explains the potential of "De Jargonator."

e. Skills for Effective Digital Portfolios
   i. Links are provided for the user "to learn the appropriate skills required to create an effective digital portfolio."
   ii. Opening FrontPage; opening and closing pages; saving a webpage; adjusting a title's font; inserting clipart; inserting a picture from file; inserting a table (drag and drop); table properties; previewing the portfolio; inserting subject names; creating a subject page; organisation of files; skills overview; swapping images; changing text; inserting a marquee (scrolling text); page transitions; changing the page background; creating bookmarks;

adjusting the subject page's layout; saveas (saving time and ensuring a consistent layout for subject pages)

iii. Hyperlinking to a: subject page; portfolio main page; another subject page; video sample; scanned document; Word document; picture file; PowerPoint presentation; sound file; marked work sample; and bookmark.

f. Freeware Programs
   i. Links are provided to the following freeware programs for downloading.
   ii. IrfanView (Image Editing Software for resizing and converting images to .jpeg and .gif formats)
   iii. Audacity (Sound Editing Software)
   iv. Windows Media Player (Plays a variety of file types including sound and video)
   v. Movie Maker (Producing movies)
   vi. Producer (Software for developing movies and other demonstrations)
   vii. Useful Code (Code to play a sound file when entering a webpage)

g. Resources
   i. Physical: Digital Camera; Scanner (preferably one that creates JPEG files); Microphone or Recording Device
   ii. Internet: Images; Animated Images; Background; and Text Images

6. Clifford Park State Special School

A. Context

a. C. Searchfield, deputy principal at Clifford Park, became active in the ePortfolio Alliance in late 2004, and had a vision of introducing the concept in the context of a special school.

b. The school received $A2700 in funding for nine TRS days to develop and share ePortfolio frameworks.

c. The following information was provided in the funding submission (see section B).
   i. Clifford Park is a specialised setting with 70 students between the ages of 12 and 19. All students have an intellectual disability. Some students also have multiple disabilities including physical impairment.
   ii. Most home groups have six to eight students with two teaching staff. Junior students are beginning their high school years. Senior students are 15 years and over who will be transitioning to post school options.
   iii. Managed Movement students have severe physical impairments and require a program based on movement and communication. Picture Exchange Communication System (PECS) students need a specific communication program to learn communication skills so that they can access the curriculum.
   iv. The school utilises the New Basics curriculum.

B. Funding Submission January, 2005

a. Expression of interest
   i. The following expression of interest in TRS funding was submitted by Clifford Park.

b. Involvement with ePortfolios so far
   i. A number of our staff attended some professional development regarding the development of electronic portfolios in the last year (organised by the DPN).
   ii. Professional dialogues when attending in-services provided by SECC (Special Education Curriculum Cluster) have also ignited our interest in digital learning portfolios.
   iii. The administration team (including the HOC) and the teaching staff have had discussions regarding our intentions to implement digital portfolios as an assessment tool.
   iv. Some areas of our school have already used videos to record students doing tasks.
   v. Our vision is to implement a much more formal process with specific outcomes for the whole school.

c. Vision for the design and application ePortfolios
   i. The framework of New Basics is the basis for our design and application of ePortfolios. This is two-fold. The collection of data relating to what students know and can do through the Repertoires of Practice is vital in New Basics. Students perform a Rich Task at the end of a three-year learning process. Because our students have very limited literacy skills, collecting appropriate data has always been difficult. Electronic portfolios offer us a way to collect information regarding our student's achievements for assessment purposes. Students can show what they have learnt by doing meaningful activities which then can be recorded electronically. At the end of the three year learning phase, moderation can take place using the ePortfolio as evidence.

   ii. Design of the ePortfolio will hinge on showing evidence electronically using the Repertoires of Practice as defined categories. Each category will be labelled and video material or still photos will be added to indicate competence in each area. Within units of a number of Rich Tasks, students need to collect and present information about themselves. This ongoing collection of material over a three-year period forms an individual portfolio.
   iii. Our vision is for students to use a simple electronic template to record information. Text, photos and movie snippets can all be part of this uncomplicated program that our students will be able to access.

d. Available resources
   i. Clifford Park Special School has already committed funds to purchasing eleven digital video cameras, making up a school total of twelve, one for each classroom. Each classroom block will also have the use of a scanner. Other associated software and hardware is also being currently purchased such as Firewire cards and Firewire Cables and tripods. Every classroom has the use of at least one computer that is capable of downloading and editing movies. Our mini lab contains three more computers as well as two available computers in the administration block for general use.
   ii. The "Writing of Symbols" program is currently being upgraded on every classroom computer so that Windows XP can be loaded onto our system. This will allow us to use Movie Maker 2.
   iii. The school already employs a teacher every Thursday to support our ICT programs and systems within the school. This support will continue for the entire year.

e. Proposed use of TRS days
   i. It is proposed that half of the TRS days will be used to buy teacher time so that in-service of our teaching staff on how to use the digital video, downloading and editing movies and photos can occur. Five TRS days would be allocated to release staff to support other schools. This may happen by other school staff visiting Clifford Park Special School to see what ePortfolios could look like, or CPSSS personnel supporting other schools in their implementation of digital portfolios.

f. School contribution
   i. Clifford Park Special School would contribute funds through the purchase of TRS days to buy specialised IT services to provide professional development to the staff at our school. The benefits of providing this professional development would be passed onto other schools when we release staff to support learning at other campuses.

g. Other information
   i. Our school has made the commitment this year to formally start the process of the design and implementation of ePortfolios. We have committed substantial financial assistance as well as the two-day a week support from our Head of Curriculum and ICT person.

C. Workshop Presentation

a. Details
   i. C. Searchfield presented a session at the March, 2005 workshop.
   ii. The title of her PowerPoint presentation summarized in sections b-f was *Making a Start*.

b. Why ePortfolios
   i. Electronic portfolios offer us a way of collecting information regarding our students' achievements.
   ii. Our students generally have limited literacy skills so collecting data through traditional means such as tests and reports is not appropriate.
   iii. Real-life or life-like tasks are much more easily recorded using electronic equipment.
   iv. Smaller increments of change can be seen in video data.
   v. Students can monitor their own learning by watching video excerpts.
   vi. Students can contribute to their own portfolios.
   vii. Reporting through watching an electronic portfolio may be much more parent friendly than receiving a written report with New Basics jargon.

c. Support for Implementation of ePortfolios
   i. Administration support through the use of hardware/software.
   ii. Professional development regarding use of hardware/software.
   iii. Deeper understanding regarding curriculum requirements.

d. Vision for the Design and Application of ePortfolios
   i. The curriculum of New Basics offers us the framework of how we will implement ePortfolios.
   ii. This is two-fold a. The collection of data by teachers relating to the Repertories of Practice (assessment) b. Student Created Presentations relating to the Rich Tasks.

e. The collection of data relating to the Repertoires of Practice
   i. Repertoires of Practice are the skills, knowledge, and processes that students need to know

ii. Digital video or digital still photos will be used to take evidence of students fulfilling the repertoire.
iii. Portfolio evidence used for Moderation at the end of a three-year suite.

f. Student Created Presentations
i. Within units of a Rich Task, outcomes focus on students collecting and presenting information about themselves.
ii. Students collect information over three-year suites.
iii. Our vision is for students to use a simple template to record information about themselves.

D. Survey Responses

a. Details
i. Surveys (see appendix C.1) were emailed to C. Searchfield and responses were returned by email.

b. Survey Responses C. Searchfield, Project Co-ordinator, September 2005.
i. Purposes for ePortfolios: Two Fold. First, for assessment and reporting ePortfolios are used to show what students can do and what they know. Teachers use a template to store information regarding how students are progressing with the Repertoires of Practice. Second, students have an electronic portfolio where they can store information about themselves. This fits well with two rich tasks, one in the seven to nine suite and the other a Transition Rich Task. Our intention is to create a tool whereby information can be used for assessment for moderation purposes and to report to parents.
ii. Types of ePortfolios: Summative and Formative. We haven't yet thought about marketing purposes but this may yet be a possibility, particularly for students moving to post school options programs.
iii. Hardware used: Video cameras, digital cameras, and scanners.
iv. Hardware procurement: No, these were budgeted for in the 2005 budget.
v. Hardware use: Only user error. Teachers need time to 'play' with the equipment.
vi. Software for collection: Microsoft PowerPoint. After discussions, I felt that PowerPoint was a program that many teachers were already familiar with and some teachers had already used this format for other purposes. Also the simplicity for student use.
vii. ePortfolio structure: Simply. FrontPage using menu buttons. Users can then move where they want clicking the named buttons. Structure based on the New Basics Framework, i.e., information structured under the rich tasks and repertoires of practice.
viii. Software for artefacts: Currently only Moviemaker 2.
ix. Items included: Students doing things to demonstrate skills and knowledge.
x. Student reflections: One area is given over to student interviews regarding their role in the school camp. (Rich Task outcome)
xi. Changes: We're not finished yet. The template has to be agreed upon by staff. Maybe it has become too complicated.
xii. Training and assistance for teachers: In-service training. Teachers given time off during class duties to be in-serviced by our IT person. Some people needed more time than others. I gave out a survey asking people if they needed more training with hardware. Used these responses to give more in class training or use of non-contact time. All in-service was done individually on their own classroom computers and video equipment. Felt this was more useful and more productive than larger groups and foreign equipment. Teachers played with their equipment this year. Further in-service will occur when template is near finishing.
xiii. Training and assistance for children: Currently none. Only getting used to being filmed for periods of time.
xiv. Other resources: I attended a three day course at the learning and development Centre on ICTs.
xv. Viewers: Our hope is the moderators at the upcoming moderation of the Special Rich Tasks. Then as a parent reporting tool.
xvi. Management issues: Stress of some teachers thinking they needed to have outcomes straight away. This was not expected. One-on-one personal interaction with the teachers solved this issue. Storage of video data and still working on this.
xvii. Teaching practices: Focused on outcomes of the Rich tasks.
xviii. Conversations: Among teachers - assessment v pedagogy v goals. Because taking data focused strongly on what students can do, there was serious reflection about what they needed to teach in the first place. For the teachers taking digital data, they had to be clear about the units they were teaching (this is in hindsight). Prompting - how often do we prompt our students? How independent are they really? Video data showed what they could do without us.

xix. Influential examples from other schools: Many of our teachers have been part of the workshops at Wilsonton. They have been influenced positively from ePortfolios shown from other schools.
xx. Sharing with other schools: Currently only through ePortfolio alliance workshops. Hopefully we can have links with the Primary Special School in the future.
xxi. Use of ePortfolio Alliance funds: Payment of the IT specialist and teacher replacement.
xxii. Further development: Further discussion regarding template. Agreement on the way forward, particularly regarding reporting procedures in 2006. Further in-service if necessary with some teachers.
xxiii. Sharing sessions: Excellent.
xxiv. Skill development sessions: Excellent, good basis to start on. Some sessions were repeated. This is very useful for beginners.
xxv. Information booklet: Good outline.
xxvi. The Learning Place Project Room: Not used as yet.
xxvii. Email discussion list: Not used as yet.
xxviii. List of web sites: Not used as yet.
xxix. Professional learning design: Yes I am (vaguely) [aware of the design]. I understand the learning framework. I think it is useful for other professional learning. I personally feel that the learning framework used is 'user-friendly' for people who have few skills in this professional area particularly if they are frightened of using technology. The workshops allowed us to 'play' with the software. Workshops across time also help with learning as we can build on information we have learnt previously. Smaller blocks of information are much easier to digest. I feel the process has been more time efficient. Learning online would not have been easily accepted by many of our staff. Participation would have been low. Personally I have gained many learnings. My own personal philosophy regarding students with disabilities and how we must be accountable for our teaching has been further enhanced this year. I am in a position where I can make a difference regarding curriculum, pedagogy, and assessment in our school.

E. Participant Comments

a. Details
  i. C. Searchfield sent the following email to T. Otto in September 2005.
b. Contents
  i. I attended the first of the digital portfolio workshops at the DSSU. I am now busily putting together a format. At the beginning of September I will attend again and we will have our first completed ePortfolio hopefully for moderation purposes. We used the program Inspirations to draw up a template. This is an excellent simple tool. On Monday we had another in-service at our school that I organised regarding taking footage and downloading. Hopefully everyone is becoming more confident!

7. Helidon State Primary School

A. Context

a. L. Eilers, principal at Helidon, was interested in developing ePortfolios across all classes in her school.
b. The school received $A2700 in funding for nine TRS days to develop and share ePortfolio frameworks.
c. Helidon caters for 100 preschool and primary children in a rural area.

B. Funding Submission January, 2005

a. Expression of Interest
  i. The following expression of interest in TRS funding was submitted by Helidon.
b. Involvement with ePortfolios so far
  i. Helidon State School is developing ePortfolios for all students including our preschoolers. The technology committee has developed a proforma for students to follow. Years one to seven have already commenced their section of the ePortfolio. In the two weeks of school, students have commenced their initial slideshow project about themselves. New skills that many have developed in this short period of time include photo scanning and the addition of hyperlinks to their PowerPoint presentations.
  ii. For the younger students, knowledge of the PowerPoint program has been developed. Our year one teacher is commencing the inclusion of the student's first piece of writing etc. as part of the ePortfolio
c. Vision for the design and application ePortfolios

i. We believe that these ePortfolios are working documents and thus can be changed, additions made etc. One section of the ePortfolio is specifically designed by the students themselves. The second section is maintained and organised by the students (links to projects, assignments etc.) while the third and final section is organised by the staff with assistance from the students e.g., achievement, academic results, examples of work, including reading progress etc.
ii. The ICT committee meets regularly. The major ICT focus for this year is the development of the ePortfolios e.g., discussing the necessary hardware, needs of staff and students, ongoing development of the layout etc.

d. Available resources
i. Helidon State School has the necessary teacher skills, knowledge and enthusiasm for these ePortfolios to be implemented successfully. We have a sufficient number of computers and access to a digital camera and scanner.
ii. In my role as Principal/Teacher Librarian, and with both a working and academic background in Educational Technology, I am giving the teachers and students 'hands-on' assistance with the development of these ePortfolios.
iii. The ePortfolio is a major focus of our ICT Learning Agreement.
iv. The P & C have donated approximately $A2000 for the purchase of hardware to assist in the development of the ePortfolios.

e. Proposed use of TRS days
i. For a part time teacher to be employed for ten TRS days to assist all students and teachers with the development of ePortfolios. He would take specific skill lessons with the students, as well as in-service our staff on specific skills. He would assist with the videotaping of students and the uploading of their files. He would also be able to use some of this time to support other schools. I would also assist him in this capacity.

f. School contribution
i. The following equipment is necessary for this initiative to succeed: digital video recorder; four scanners, four digital cameras, software (e.g., disks). Five TRS days would also be incorporated into our ICT Learning Agreement.

g. Other information
i. We believe that we can develop a whole school approach to ePortfolios, which can be shared across schools. All of our staff members have computer skills, about 20% with good skills and 80% excellent skills. We believe that we have the expertise and will soon have the equipment, but need assistance in providing an extra teacher during school hours to assist with the development of our ePortfolios, as well as provide assistance to other schools (particularly some of the Band 5 [one and two teacher] schools in our area).

C. Staff Development Presentation May, 2005

a. Details
i. L. Eilers, principal at Helidon, presented a session at the workshop in May, 2005. She displayed examples of ePortfolios while talking about how they were implementing ePortfolios across the school.
ii. T. Otto videoed the session and prepared the transcript in section b.

b. Presentation Transcript
i. L. Eilers: We hadn't done anything at all until this year so it has been a really big learning curve for us. We had a planning stage and worked out what we wanted to do, but while we are actually doing it we are making changes all the time. We figured that next year when we actually do this we get into it a lot more efficiently than we have this year. We started off we wanted the children to have a lot of input into it. Then we realised in year one it was very difficult for them to have as much input as perhaps we wanted to, particularly at the start of the year. We decided we wanted the ePortfolios to look a bit more professional as well. We wanted children's input but also to have that professional aspect to it. We came up with a cover page so that all the children have the same cover. This is a child in year one. The next page as well, all the ePortfolios have that, a contents page. With the year one . . .
ii. Year One teacher from Helidon: We did the writing and then I either typed it up all in capital letters or wrote it all in capital letters so that they could recognise the letters on the keyboard. A lot of this happened before they knew many letters. Capital letters, that definitely helped a lot, but they typed it all up themselves and did all the hyperlinks themselves. So it's just a lot of examples and once you've done it four or five times, they can cope with it.
iii. L. Eilers: This was a lot of writing, put a picture in, favourite things. This was a lot of writing because you can imagine with years one and two the amount of time you spend actually getting that information from them. We bought a digital camera. I'm not used to this mouse [on the lap top]. I actually like a mouse you can move around. Now that was just another one there. This was a lot of work for us and the fact that we hadn't used Movie Maker before and a

lot of learning had to happen for us before we could actually do it with the children. Size was of concern for us as well, to fit it on a disc. So we have done only 20 seconds as a maximum when we do any videoing. We went out and bought a large hard drive for one of the computers because storing all the information is another thing. Twenty seconds uses six MB so that is quite a large amount. Now let's have a look at one from the upper class.

iv. T. Otto: While Liz is doing that, things that I've noticed is the fact that ePortfolios are a collection of a child's work and you can see that in this ePortfolio. Think too about the use of PowerPoint because we are used to going to seminars and seeing first slide, second slide, third slide in that order. This is using PowerPoint where you hyperlink pages together and you haven't got a linear effect. You are bouncing all around the place. I think the other thing there is what children are capable of with year one doing hyperlinking after four or five goes. So we should give children credit for being able to do a lot more than we think they are capable of doing. Notice the use of the scanner to enter children's writing and the learning that went on before they could do this.

v. L. Eilers: With the older children we have been doing a lot of Word documents and we have got to the stage of working out how we could put it on the ePortfolio without the children making changes to it. We are going to put their report cards on it and we didn't want them to be able to just download the report card and change it all around and print out a nice report card for themselves. So that is why we discovered PDF. We are actually saving documents to PDF file. Now most of you may know that, but we didn't until a few weeks ago. Now this is all [student's] work that he has decided [to include] and you'll see some of the slides and you'll know it's his decision for what he's used. Now you'll notice, and we only just noticed ourselves, that we haven't got a link in yet back to the contents page. You find these mistakes constantly and you think that you're right and then you realize something's missing. So I'll just have to escape. This time instead of just reading they actually did a report and so [student's] report was on natural disasters [student reading report on video clip]. So you can see we are going to do a ballad this month so we are all ready for that one to go on. We'll have a look at some writing samples, and again, as you can see [student] designed this page [laughter]. It's a little difficult to read and we wanted them to have that input into it. I would have dearly loved to have said the background's too dark and the font colour isn't all that great to read, but that is what he wanted. If you have a look here at his natural disaster brochure . . . we have linked the brochure he has done and we've saved that one as a PDF file so he's got that there and can't make changes to it. The marking, the teachers did a rubric so that he's got that on as well. He's got his marking scheme there and has access to that, and we put corrections on as well. So that's their unit on natural disasters and he's got something about that unit, what he liked and didn't like doing etc. in it. We'll be doing that as we go through the year as well. Achievements will be something that will also be an ongoing aspect for him. Again, this was his design; there he is in the background. In term two we have awards like student of the week so it will just go into that. Assessment, and that links back to his brochure. We are going to put in report cards. So I think we have gone a long way. It certainly has helped that we are a small school and we've got the entire staff doing this and behind getting things done. So the children are doing very, very well.

8. Wilsonton State Primary School

A. Context

a. T. Mancktelow, deputy principal at Wilsonton, co-ordinated the implementation of ePortfolios at Wilsonton.
b. The school received $A2700 in funding for nine TRS days to develop and share ePortfolio frameworks.
c. Wilsonton caters for 800 preschool and primary children in the city of Toowoomba.

B. Funding Submission January, 2005

a. Expression of Interest
    i. The following expression of interest in TRS funding was submitted by Wilsonton for TRS days to be shared between three teachers to develop ePortfolio frameworks for students in primary classes and the Special Education Unit, and to share and to assist other year levels to develop similar student ePortfolios.
b. Involvement with ePortfolios so far
    i. Our deputy principal (T. Mancktelow) has attended the Alliance group meetings and tried to share ideas across schools in this way.
    ii. We have encouraged teacher use of digital cameras, (photo and video) to record student outcomes in classroom situations and to share these during parent interviews.

iii. Submitted a proposal to Central Office for funding for an ICT specific building which will incorporate a recording studio and video/performance studio to aid teachers in using and developing effective ePortfolios. We were successful, gaining a grant of $A485 000. Building due to start late 2005.

c. Vision for the design and application ePortfolios
    i. The design would follow the developmental examples gleaned from other schools at present, but we hope to structure to suit our own needs and computerised reporting.
    ii. It is hoped the ePortfolio would contain examples of work and performances across the year and transferred to DVD for sharing.
    iii. We have digital cameras and video camera equipment plus a laptop lab which could be shared in the two rooms.
d. Available resources
    i. We have DVD burners in each school lab (three at present). We will happily provide a budget allocation and three TRS days in total for the three teachers for consumables and necessary costs for training and other resource purchases ($A2500), if we could gain the assistance from the Alliance for TRS release cover.
e. Proposed use of TRS days
    i. To enable the teachers to attend training and sharing of ideas with other teachers in the District and Brisbane to enable the development of an effective model.
    ii. To enable release to allow the use of knowledge and expertise from Wilsonton Campus Science and Technology Centre to aid development of the ePortfolio model.

C. Workshop Presentation
a. Details
    i. T. Mancktelow, deputy principal, and three of his teachers presented a session at the workshop in May, 2005. They displayed examples of ePortfolios while talking about what they were doing and the difficulties they had overcome.
b. Presentation
    i. T. Mancktelow (deputy principal): We have been given some money, about $A2700, and we are trying to put it into TRS days mainly and a digital camera. There are three teachers involved, our SEU [Special Education Unit] and years four and five. They've all gone in different directions with ePortfolios, looking at different aspects. [R. Duck's] going to show you a Movie Maker presentation as to how she used it with kids for assessment. [H. Thomson's] taken it with her planning and looked at digital portfolios and how it can help with SEU students recording their improvements during the semester and [D. Klease] has just started out doing some PowerPoint presentations with her kids to aid the assessment and reporting of oral reports and things like that. The idea of looking at it across the school is to get teachers to get the chance of using the equipment and learning different ways of producing presentations and recording assessment with children and then we're going to look at a whole school approach from next year. But this year was building up a plan for the sorts of things we could do in the different grade levels, then trying to put it together across the school. I think our first main problem this year is the fact that our computers are all fairly slow. A lot of our computers are probably four or five years old and once you start using Movie Maker and that sort of presentation, getting on the Internet or downloading information for kids to put into things, it slows the system down tremendously. We are having trouble keeping the kids on the computers and completing tasks in a short period of time. Obviously in a class of 25 it is difficult for the teacher, so we are looking at trying to solve these problems and come up with something realistic that will help our school to record how the kids are going on a long term basis. I'll pass you on to Rhonda.
    ii. R. Duck (Year five teacher): This is my Movie Maker happening up here just so you have an idea of what we ended up with. We are supposedly the smart state and therefore I was going to use technology to work smarter. The first part is we were doing an integrated unit on Creature Features and part of that was the children had to do an oral report about an animal and its cycle and to go with that they did a PowerPoint presentation behind them. The idea was that they were like a news reporter and that was the screen behind them, so that they did a talk to their class. Now by having a video of their presentation I was therefore able to account for all of my marks that I gave them for their oral presentation and the PowerPoint, which was part of the assessment for that unit. And we've used it lots of times to show the parents. A picture paints a thousand words. I have a little piece that I showed Trevor before about [an inappropriate] signal that a child gave when the teacher wasn't looking, so I just kept that. So I came to the inservice that was here with Tom, and that was great. They told me I needed a web cam and it cost me $A60. I didn't use the school equipment and got a $A60 web cam from Dick Smith,

trialled it, and it was hopeless [laughter]. It's got a little mike in it but the mike wouldn't work to pick up their voices. So we tried again. I went to [T. Mancktelow] and he said what I needed was to use the school mike. The child held it, tried to press the buttons and read the palm cards. Didn't work [laughter]! So then I bought this and that cost $A14, that headpiece with the voice microphone in it. It worked when Trevor came to turn the mike on [laughter]. So you've got to be willing to have a go and keep trying and trying. So as you can see I've attempted several times, got through several hassles, and still not finished. You've got to persist. I have videoed all the children. We have made a movie of all of them. I tried editing. As you can see I go through the different children. We have it playing for them to have a look at how they did it last time. I've got it sectioned off to put in their digital portfolios. The kids love it. They like seeing themselves. My next problem is I can't share it with anyone. It's on my computer but we can't get it on to other computers in the school because it's Movie Maker 2. That's what I was told to go to. I can't email it to people. I'm still looking for that solution. The parents have seen it, those who were interested in it and I've got other things I'm going to do.

iii. T. Mancktelow: There are lots of things for teachers to learn. It's not just a straightforward thing, once you start using the upper level programs like Movie Maker 2.

iv. H. Thomson: I was straight year one last year and I basically fell into special education. I guess it's been a bit of a steep learning curve for me in that the units we planned last year as a whole school, I got to Special Ed and hey, the assessment part doesn't necessarily fit those types of children. So I thought that digital portfolios might be able to help us out there. So what I did this term, I looked at our unit plan and sought assessment tasks that could lend themselves to digital portfolios because of their limited skills with writing and reading. I realised that perhaps using the digital camera could enhance my assessment of their tasks for recording purposes. So basically what I did was set up a template and after I'd talked about and discussed and internalised what assessment tasks I was going to put on my digital portfolios I then went through and sort of made a mind map of how my digital portfolio was going to be structured. Basically what I did was put their personal details on the front then I went to the assessable learning outcomes to put on my digital portfolio. I still haven't finished because it's still a work in progress. What I've done is broken the learning tasks up into core learning areas, then the outcomes, then the learning activities used to enhance their learning, and then through those learning activities to be able to assess their learning. Then I was able to quickly take their photo, interview them, and give them a rating very quickly. I've gone through and for each of those tasks I've been able to match the learning activity with the assessment task that I've given them. I've found it a really useful tool because the traditional learning activities and assessment tasks that year ones do were a little bit out of their range of ability so it was useful for me to be able to actually digitally record it and then write it and talk about what they've said as well as coming up with the standard referents as to why I've given them the mark. I did a template and then once I'd done the template I was able then to put in each child's photo and their work so I could have a whole class of students with the same template.

9. Glenvale State Primary School

A. Context

a. L. Brosnan, a teacher at Glenvale, experimented with ePortfolios with her year one class in 2004. As technology co-ordinator at Glenvale in 2005, she decided to enlist the support of her active Technology Committee to promote the implementation of ePortfolios.

b. The school received $A2700 in funding for nine TRS days to develop and share ePortfolio frameworks.

c. Glenvale caters for 550 preschool and primary students in the city of Toowoomba.

B. Funding Submission January, 2005

a. Expression of interest
   i. The following expression of interest was submitted for TRS for teachers to develop ePortfolios to share with other teachers.

b. Involvement with ePortfolios so far
   i. Six teachers participated in the professional development day for ePortfolios in October, 2004 at the TTMSCE.
   ii. Information sourced from Internet and other educational publications.
   iii. Two teachers then created a simplified version of an ePortfolio for year one students. This has been presented to the school's computer committee. The computer committee motioned to show whole staff the examples of ePortfolios along with some clearly defined purposes for

ePortfolio. This will provide staff with an idea of the direction we could take with ICT's in the school. Examples of ePortfolios still at infant stage of development.

c. Vision for the design and application ePortfolios
    i. Glenvale State School sees ICT's as a vital component in education.
    ii. In 2005, the new position of Technology Coordinator has been created (five days each fortnight).
    iii. The design of an ePortfolio is still in its preliminary stages.
    iv. We believe ePortfolios should reflect the student's work, capturing a holistic view of our student's education.
    v. We believe ePortfolios will provide an excellent platform to achieve many of our visions and
        provide a purpose for teachers to update their personal computer skills and encourage them to integrate ICT more and more into their planning.
        provide students with opportunities for skill enhancement, incentives for work application, and opportunities to reflect on their learning and achievements,
        provide parents, particularly those with limited access to school, and the community with a greater insight into the education of their children.

d. Available resources
    i. A number of new computers (17) scattered around the school currently being installed with XP; 1 lab in school also with ten computers running on XP; Technology Coordinator (five days/fortnight); Curriculum Coordinator (five days /fortnight); computer committee (seven members meets fortnightly); 17 internal CD burners, two external CD burners; seven digital cameras; web cams; digital video recorder; MP3 players/memory sticks; scanners

e. Proposed use of TRS days
    i. Visiting other schools to ascertain best practice
    ii. Professional development
    iii. Design and create ePortfolios in collaboration with computer committee and later, whole school staff;
    iv. In servicing staff

f. School contribution
    i. Glenvale State School is prepared to commit eight TRS days to the project. Extra TRS would enable other computer committee members release time to add valuable input to the project.

g. Other information
    i. Glenvale believes the more staff that has "ownership," the more successful the implementation across the whole school.

C. Examples of ePortfolios

a. Details
    i. The following email messages between L. Brosnan (Technology Co-ordinator) and T. Otto relate to a request for examples of ePortfolios.
    ii. L. Brosnan: I have shown the staff web cams, but am having a few hiccups with the XP machines, opening up videos from web cam is fine when you are in original folder but if you save it to anyone's H: drive, media player defaults and sometimes will/won't play video. I'm sure it's just a little thing but I'm a bit stumped with it at the moment. Will have to bring you up to speed on how what we've been doing since I last saw you. Lots of in-school professional development occurring, got 20 of the teachers volunteering for professional development which was more than I thought I'd get. Two missed out and have been chasing me since reminding me not to forget them when I run the shops again. Looking into running more workshops for the teacher aides in the last week of school term. Major hassles with server/space/XP etc. Would still be interested in any exemplar you have for me to show staff. Looking forward to see what Liz has been up to.
    iii. T. Otto: Pleased to hear about the progress and enthusiasm at your place. We are videoing the first session of the PD in May, so that will be available for teachers who are unable to attend. Yes, Liz is doing some exiting things. Enclosed is a CD of examples. The first uses PowerPoint and contains three videos of a year one child as he progressed in reading in year one. The second uses FrontPage, but included too much information, e.g., running records that were just as useful on a piece of paper. This created too much work, when the videos on their own achieved just about all we wanted. The year 5/6's did a personal PowerPoint presentation. This is OK to get kids into the program, provided they move on in their development e.g., look at the stages of developing ePortfolios in my booklet. I have included three examples of stories created with Photo Story 3. This is a very powerful but simple and easy to use program available free as a download from Microsoft. You need XP and also the software Direct X and Media Player 10, both available from the same site. The program uses still digital images and introduces children to the same principles involved in video editing but much simpler. The still

images look like a video presentation. Car Wash was created by [S. Fuller] over at Pilton. You can see he has been quite creative. I put together "Netball Darwin" of my daughter playing in the Qld U19 team. Shows how teachers might like to learn how to use the program by putting together holiday snaps. The year seven's here made mini-golf courses as a technology integrated project. They took the photos then created the presentation. We should then get the children to do a narration that goes with the presentation as part of the very important reflection process. This one is a little long - perhaps need only one shot of each course - learn as you go along. In the literature associated with ePortfolios, you will often see references to story telling. That is, an ePortfolio is really just another expression of a story about a person. So creating a photo story, particularly if it includes children's reflections, is quite acceptable. The main criteria is that it serves a purpose, and putting together the golf presentation, for example, was a logical extension or culminating activity for the project. Let me know if I can help.

D. Workshop Presentation

a. Details

  i. In 2004, L Brosnan (Technology Co-ordinator and year one teacher) developed an ePortfolio of her year one children's work (see Figure F.6). This example was presented at the workshop for teachers in the Early Phase of Schooling in February, 2005, and at the workshop in March, 2005.

b. Examples

  i. The ePortfolio in Figure F.6 was developed in 2005 and used as a tool at parent/teacher meetings to discuss activities within the Glenvale Preschool. The Preschool Developmental Profile in Table F.1 provided parents with an individual report about the progress of their child. Only three outcomes from the profile have been included.

  ii. Figure F.7 and F.8 are examples of year one ePortfolios developed at Glenvale.

  iii. Figure F.9 is a year two ePortfolio at Glenvale.

  iv. Figure F.10 is a year five ePortfolio at Glenvale.

Figure F.2: A Preschool ePortfolio

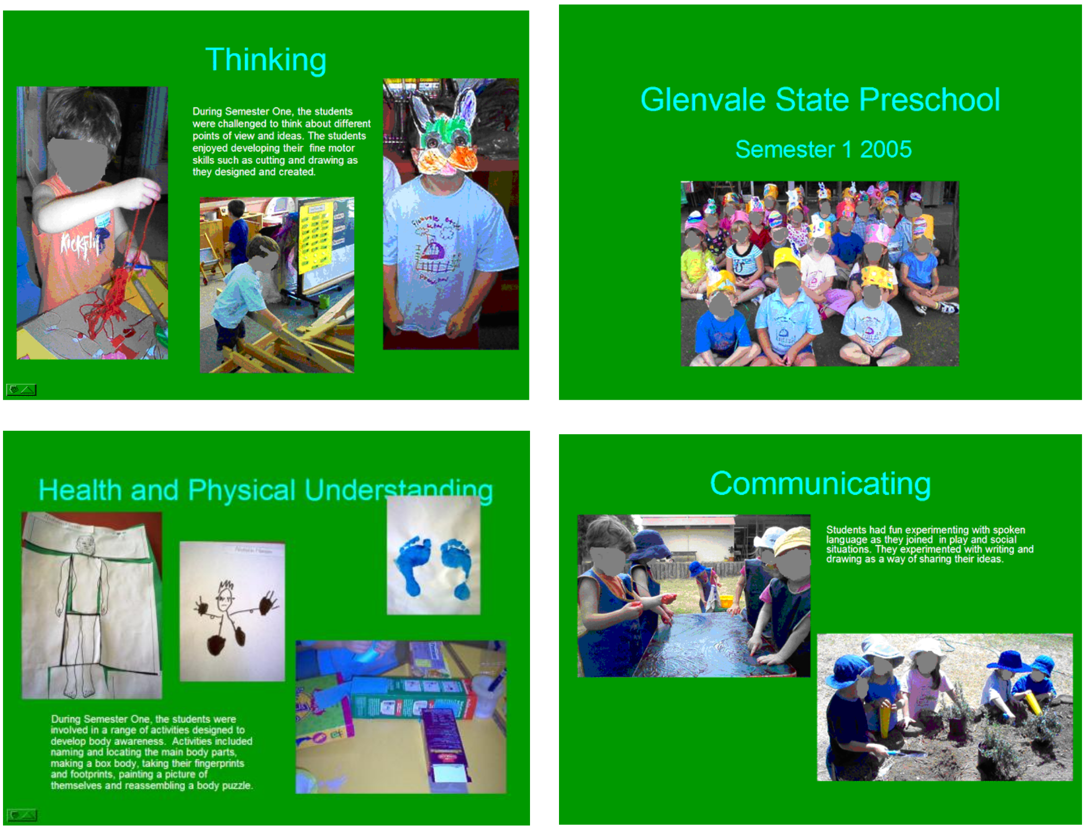


Table F.1: Preschool Developmental Profile

<table>
<tr><td colspan="2" align="center">Glenvale State Preschool
Developmental Profile Semester One, 2005

</td></tr>
<tr><td colspan="2">The following developmental profile describes individual stages of development in Foundation Learning Areas using specific indicators to demonstrate the achievement of learning outcomes. Comments and a rating for each area are entered in a column on the right. Emergent: E; Age-appropriate: A; Strongly Developed: S</td></tr>
<tr><td align="center">Outcome</td><td align="center">Indicators</td></tr>
<tr><td>a. Thinking: Uses a range of critical and creative thinking processes in everyday situations and purposeful experiences.</td><td>i. Engages in imaginative play.
ii. Wants to explore purposefully.
iii. Independently selects a task.
iv. Maintains attention to the task and tries again if unable to accomplish the task.</td></tr>
<tr><td>b. Communicating: Demonstrates growing competence in expressing needs, feelings and ideas.</td><td>i. Growing competence to talk in front of the group.
ii. Participates in discussions.
iii. Listens without interrupting
iv. Articulates clearly.
v. Forms sentences appropriately.</td></tr>
<tr><td>c. Sense of Self and Others: Develops a positive self concept and enhanced self esteem.</td><td>i. Separates easily from caregiver.
ii. Usually happy and shows enjoyment of preschool.
iii. Freely participates in a variety of activities.
iv. Proud of achievements.
v. Becomes sensitive to the needs and feelings of others.
vi. Shows a caring, responsible attitude to others.
vii. Expresses own ideas and feelings.
viii. Initiates communication and interactions with others.</td></tr>
</table>

Figure F.3: A Year One ePortfolio

Figure F.4: A Year One ePortfolio

Figure F.5: A Year Two ePortfolio

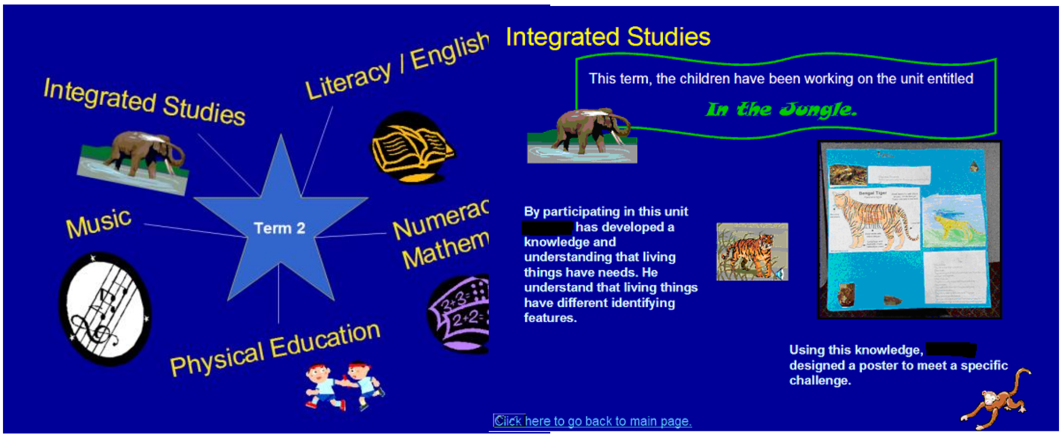


Figure F.6: A Year Five ePortfolio

10. Centenary Heights State High School

A. Context

a. M. Zilm, Head of Department, co-ordinated the implementation of ePortfolios at Centenary Heights.
b. The school received $A2700 in funding for nine TRS days to develop and share ePortfolio frameworks.
c. Centenary Heights caters for 1000 students from year eight to year twelve in the city of Toowoomba.

B. Funding Submission

a. Expression of Interest
   i. The following expression of interest was submitted in January, 2005 for TRS for an individual teacher in close collaboration with other key staff at this school to develop ePortfolios and share with other teachers.
b. Involvement with ePortfolios so far
   i. The school has researched material and personnel resource requirements for implementing e-folios
   ii. Identified critical role of e-folios in curriculum planning and delivery and ultimately in assessment and reporting specifically in regard to tri-conferencing and the inception of Learning Improvement Plans
c. Vision for the design and application ePortfolios
   i. Target the year eight transition class where collaborative and co-operative curriculum design and delivery will enable e-folios to be established and applied in comprehensive and practical contexts.
   ii. Develop holistic student profiles with personal and academic aspects, ultimately providing facility for data recording and progress monitoring. Student driven and teacher entry sections.
   iii. Establish structures and processes for the eventual electronic transfer of e-folios from primary to secondary schools to facilitate further constructivist learning opportunities and approaches based on student needs and achievement, and efficient and expedient inter-school sharing of critical relevant data and information.

d. Available resources
    i. Necessary software and hardware based on information to date
    ii. Enthusiastic and skilled staff with actively supportive Middle and Senior Management
e. Proposed use of TRS days
    i. Class group identified with curriculum design and assessment preparation technology appropriate, with immediate capacity for extension and enhancement to accommodate e-folios. Ready access to technology.
    ii. Professional development of key staff
    iii. Establishment of e-folios and appropriate systems for class use and ready access.
f. School contribution
    i. Release time for key personnel
    ii. Purchase of some essential hardware and software as deemed appropriate
g. Other information
    i. CHSHS is keen to pursue e-folios in a diverse range of capacities with the view to exploring, and ultimately exploiting, their enormous educational potential at school, cluster, district and state levels.

C. Student Display

a. Details
    i. In December 2005, M. Haberman, a teacher at Centenary Heights State High School invited parents, friends, and staff to view the ePortfolios developed by her year eight class. T. Otto and S. Denman from Withcott State School attended and spoke with students individually about their work.
b. Notice in the Centenary Heights school newsletter
    i. A growing trend around the world is to replace the plastic display folder with an electronic presentation. This year several schools in the Toowoomba region have been trialling this idea for the presentation of student work via the computer. Centenary Heights joined the trial as the only secondary school. We are interested in using the e-portfolio idea for assembling a collection of student's assignments and assessment pieces to demonstrate the level of achievement that student has reached in a particular year. Such a CD collection could be shown to parents so they can see the standard of work completed by their child. It would enable parents to become more involved with a student's total school experience. The idea also leads naturally on to the concept of presenting an e-portfolio resume on a CD to a prospective employer. Such a collection can feature samples of work (as a display folder would) and also demonstrate technical skills in preparing this work and using certain software. This year we have used 8I [class number] as the trial class and they have enjoyed the experience of using Dream-Weaver and frames to build their presentations. Now we'd like to show their e-portfolios to parents, friends and staff. You are invited to view some of these by visiting the school library on Friday, 2 December, from 11.30 am to 1.30 pm when 8I will be concluding the project for 2005 or on another occasion by arrangement with Mrs Haberman. You will be most welcome.
c. The visit
    i. One out of the eight year eight classes at the school were working on ePortfolios as a trial.
    ii. During the open day, the students worked on their ePortfolios in the computer lab while one student at a time demonstrated their ePortfolio on a computer at the front of the room using a data projector.
    iii. The students were open and comfortable in talking about their work. There was evidence during the session of peer collaboration and support as students either talked quietly to their neighbours or offered suggestions to the student at the front when aspects of their ePortfolio did not function. There appeared to be issues with hyperlinking files that needed to be resolved.
    iv. The teacher gave students a framework on which to build their ePortfolios, which included
        About Me: academic achievements, sport, music, photo, and what students do at and after school;
        Subjects: projects in English, Studies of Society and the Environment (SOSE), Science, Health and Physical Education, Manual Arts, and Music.
        Other Activities
    v. A student reported that he worked on his ePortfolio in the computer laboratory during two to three of his weekly English lessons. The teacher would provide direction on a required task and students could work on their own with support over the following few weeks to complete the task. The ePortfolios did not include self, peer, or teacher reflections or goals, but the student thought this would be a good idea. No record was kept of drafts, with students responding to teacher feedback until drafts became completed pieces of work. This student

considered himself "not much of an ICT person" and that his ePortfolio did not include as much material as other students. He would like to include videos, particularly of sport and music. He would like to build on his ePortfolio in year nine, storing some completed items and taking a copy home each year. As a Manual Arts student, he was able to transfer to his ePortfolio drawings created in Graphics using Pro Desktop. He recognised that he was using the same tools as professionals in the building industry, and enjoyed following a project through from the design phase to the completed article. In Studies of Society and Environment (SOSE) he had prepared a project in FrontPage on the Moore River Settlement as a study of the history of Australian Aborigines. He created a PowerPoint presentation for a theory project in Physical Education. In Science, he copied written notes from practical work into a Word document for inclusion in the ePortfolio.

vi. Another student reported that access to hardware such as cameras and scanners was limited and that an adult performed operations such as scanning.

11. Withcott State Primary School

A. Context

a. T. Otto, principal researcher and principal at Withcott, implemented ePortfolios at his school.
b. Withcott caters for 280 preschool and primary children in a rural area.

B. Funding Submission

a. Expression of Interest
   i. The following expression of interest was prepared in January, 2005 for TRS days for a teacher to develop ePortfolios and share with other teachers.
   ii. The expression of interest was withdrawn to allow sufficient funds for other schools. TRS was not a critical requirement as S. Denman was the teacher librarian and T. Otto a non-teaching principal.
b. Involvement with ePortfolios so far
   i. Developed an ePortfolio to capture student progress in reading in year one.
   ii. Developed ePortfolios with a year five/six class, with the intention of continuing to work with that class as they progress through the school.
   iii. Organised and attended workshops, close involvement with the DPN, eA.
   iv. Prepared a paper on ePortfolios for sharing, addressed several teacher and principal groups, presented a paper about the DPN at ePortfolio Australia, invited to speak at USQ faculty meeting.
c. Vision for the design and application ePortfolios
   i. Want to support teachers at Withcott and elsewhere to meet the grassroots interest in ePortfolios.
   ii. See ePortfolios as a logical progression in the classroom integration of ICTs.
   iii. Keen to move beyond the obvious and look at how we can make a real difference in teaching and learning (see paper).
d. Available resources
   i. Two computer labs and computers in classrooms, digital cameras, scanners, digital video camera, dedicated video editing computer with appropriate software, colour and laser printers, appropriate software.
e. Proposed use of TRS days
   i. Continued development of ePortfolio models at the school.
   ii. Collect models from our own and other schools to share with others.
f. School contribution
   i. Teachers and principals have visited and are arranging to visit Withcott to discuss ePortfolios, which represents a commitment of time
   ii. Equivalent of at least five TRS days to be committed
g. Other information
   i. As an experienced teacher librarian, Sharon Denman has valuable skills in working with teachers, network management, trouble shooting, file management, collection and organization of information (both print and ICT based), video editing, scanning, and has already been involved in developing ePortfolios.

C. ePortfolios Developed

a. Details
   i. Throughout 2004, T. Otto (principal) and S. Denman (Teacher Librarian) developed two types of ePortfolios to record the progress of children in year one. In the first, FrontPage was used to collate a series of three video recordings of the year one children reading in March, May, and

November, as well as the child's picture, reading record, checklist of the first hundred words, and a handwriting sample (see Figure F.7). The work involved was too extensive to sustain, and consequently a PowerPoint ePortfolio was created which included just the videos (see Figure F.8).

Figure F.7: FrontPage ePortfolio

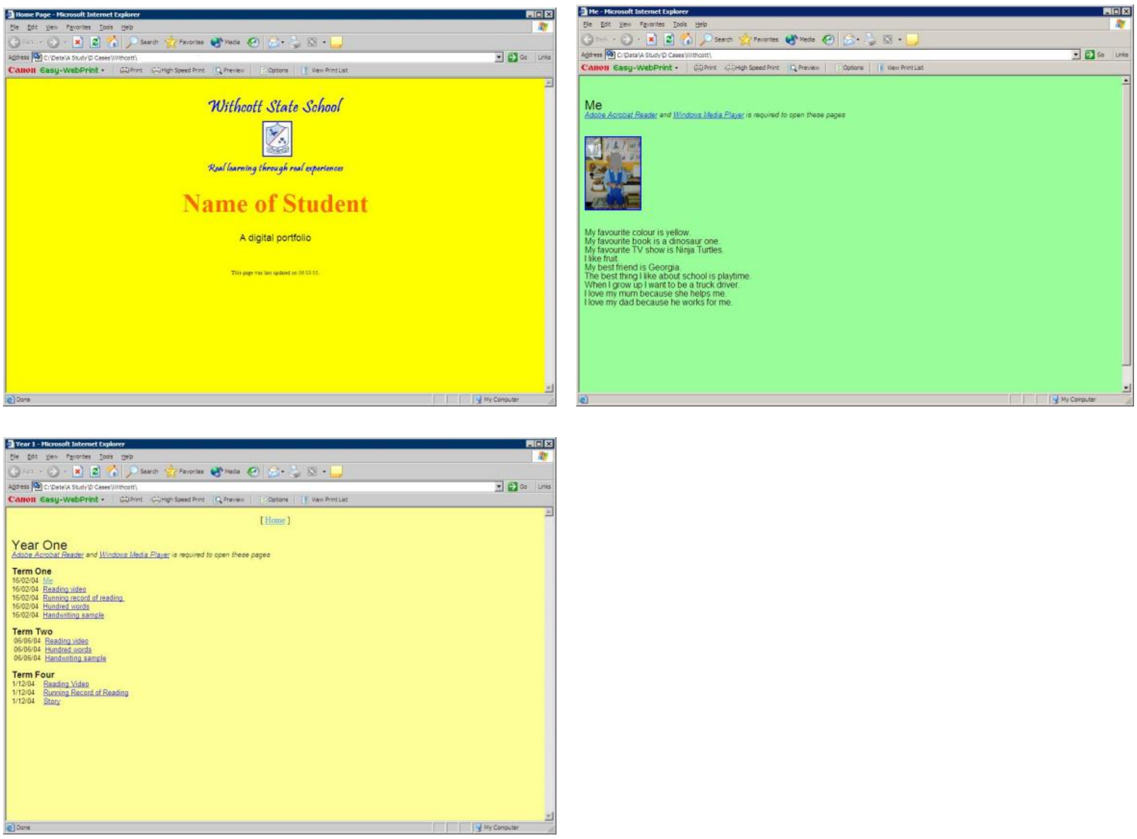
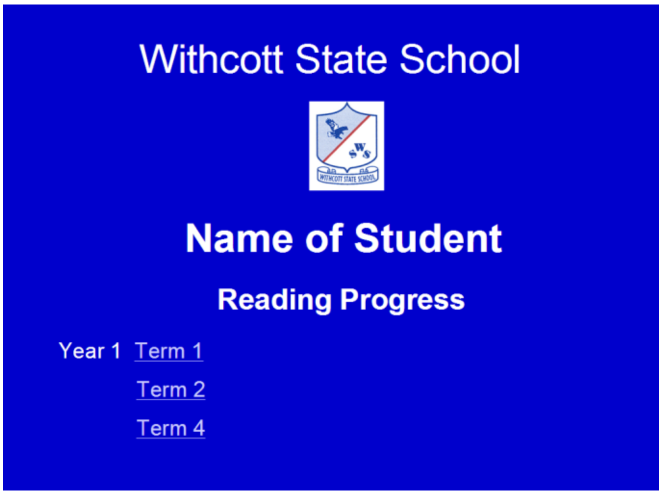
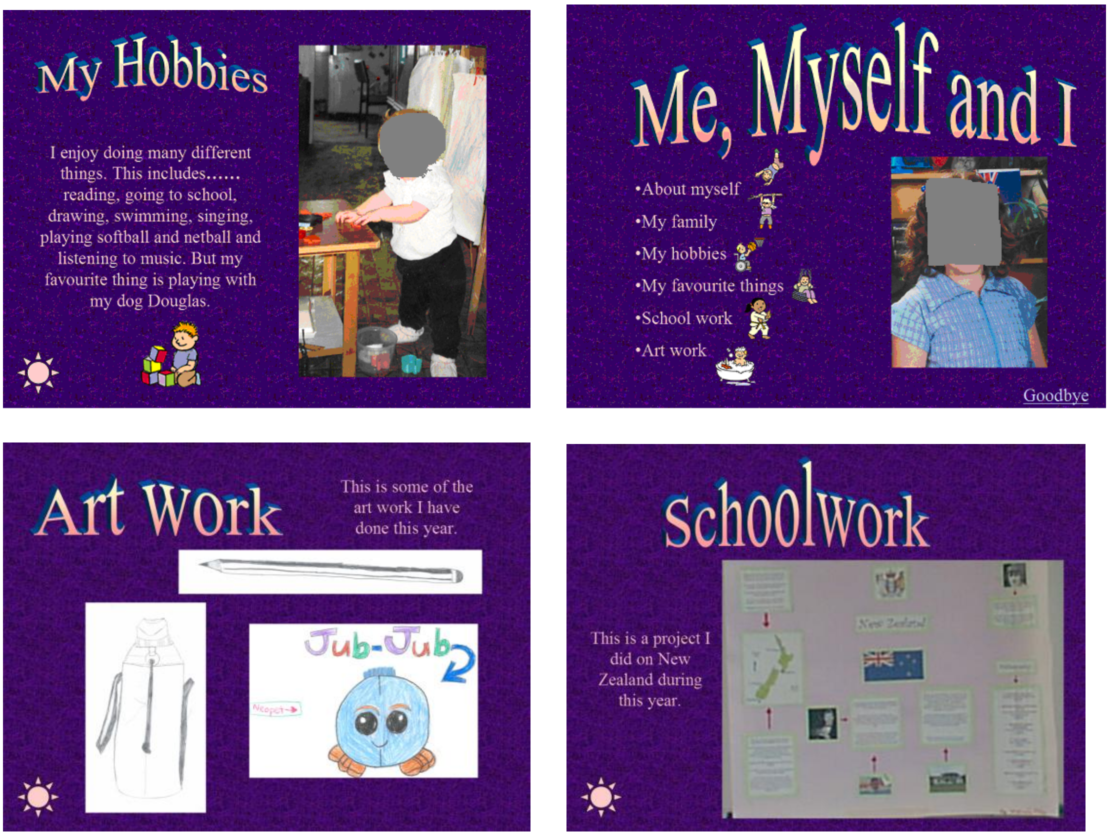


Figure F.8: PowerPoint ePortfolio



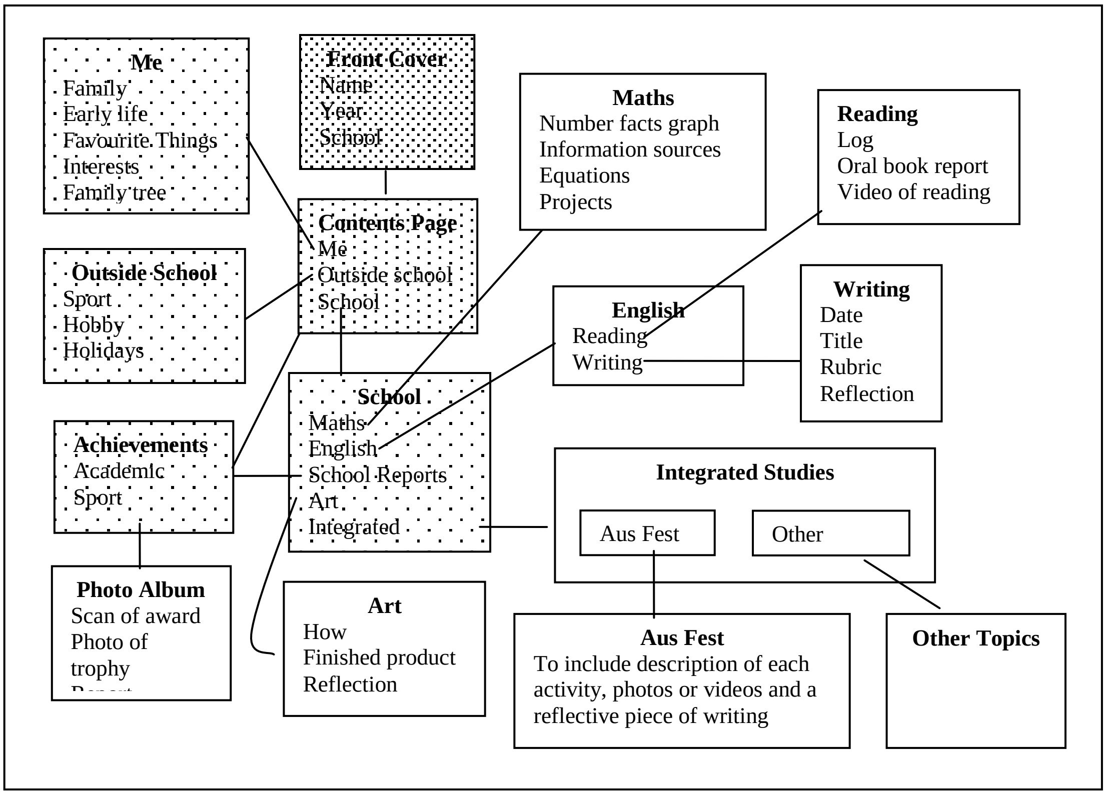
ii. In Semester Two 2004, S. Denman (teacher librarian) and T. Dempsey (class teacher) and her year five/six class (see Figure F.9) developed PowerPoint presentations that included the child's personal information and samples of school work.

Figure F.9: Personal Information and Samples of Work



iii. In 2005, S Denman and T. Dempsey continued their work of the previous year, and designed a structure for ePortfolios in consultation with the children to guide them in their collections (see Figure F.10). This diagram was distributed to other schools on a CD-ROM with other resources.

Figure F.10: An ePortfolio Structure



b. Student feedback

i. Children in the year five/six class developing ePortfolios with S. Denman and T. Dempsey were asked in September 2005 to provide feedback. Responses are listed in sections ii to xix.

ii. I like doing them because then I don't work in a textbook. It's good because we learn new skills. It's all my creation and ideas. You use your imagination on how it looks.

iii. Useful for not needing as much as you used to. Know what you did at school when older. I learn how to use PowerPoint. I learn how to hyperlink, use clips, design and organise. I think that it is really good because you get a chance to fiddle around with the computers in class.

iv. They're quick to get into and you can get all your information about it. You learn things that you can do at home. You can find each folder easily. You can give your own opinion. You can learn how to do hyperlink. You can keep track of time. No one can teach you what to do. You can learn new things. It's your own private diary. It lets you put our own pictures on it. It is helpful in getting jobs. You can write personal things on it. You design your own things.

v. So kids learn to show teachers, adults etc. Help to remember. To know how to work power point. Custom animation. The Title. To draw the textbox. Changing background. Clip art. Basic shapes. Portfolios are fun and helpful. To get out of work. So you can help people.

vi. To learn more about how to use a computer, learning how to use power point, word and giving our own opinion by typing rather than speaking. We learn how to type freely and more easily. I think it's easier to type rather than writing. Designing things are fun.

vii. I like doing the portfolio so then I can get out of the classroom. I've learnt how to type faster and a lot of other things too. I think it's a good project for me to do.

viii. To learn more about the computer and how to use it and learn more skills. We learn how to hyperlink and do different things. That you can do your own things and have fun.

ix. Useful for presentations and a profile of yourself. It's better than looking through a pile of paper just to find a bit of information about things. The skills I have learnt and can learn are hyper linking and how to get pictures on the Internet. It's a great way to write things and make it look pretty.

x. They're useful for; telling your parents what you have done in school, memories, education and helping others. Skills I have learnt are; how to hyperlink, use power point, backgrounds, Icam, animation, getting pictures from the internet and design. It is really great to be able to use PowerPoint. It's good to help other people and it's really fun to do.

xi. To know what you've done in the past. Know how they are used. You can make your own. You can give information. If you are with someone they can help you to use the computers and give you an opportunity to do it. There is word art and designing backgrounds.

xii. Learn lots of skills. Can give our opinion. Being on a computer instead of in class and writing in text books. Technology skills. Being able to design your own slides and stuff.

xiii. They're fun. Help us learn more about computers. They're easy. We get to say our opinion. It's like your own diary. It gives you a choice. You get to design the pages yourself.

xiv. Useful skills. Great fun. Give your opinion. Learning with fun. Get to do it your way and use bright colours. Good to get out of work.

xv. More skills. You get to miss Maths and reading. Better on Word. To help us learn some of the computer skills for high school. To figure out what to do. To remember what's happened in the past. To use a computer, keyboard, typing and to learn to use power point and Word. Using a computer this early in grade six is really good because it gives us a chance to recognise how hard it is.

xvi. It's really cool to be able to do what we want. I learn new things. It is a lot more fun than being in class. It's work and having fun at the same time. We learn new skills. I enjoy making hyperlinks and backgrounds. I like putting pictures on my power point. It'll be cool to look back on. I can compare my results over the years. It isn't as boring as class.

xvii. Showing parents what you've done. You can set it out however you want. Giving information about yourself. How to use it. Looking back and seeing what you have done. How to hyperlink.

xviii. Designing your pages. Trying to find a background you like. It's fun. You learn. People can help you if you're stuck. Make animations for your pictures.

xix. It's useful for showing our parents and other people what we have learnt. When we have been to the power point we have learnt how to hyperlink, backgrounds and I can use clipart. I liked working on the computer because we could get pictures for power point.

D. ICT Pedagogical Licence Portfolio

a. Details
   i. S. Denman was able to apply what she learnt through her involvement in the ePortfolio Project to gain her ICT Pedagogical Licence.
   ii. The portfolio that she developed and submitted to gain her licence (as outlined below) describes her personal learning journey and one of the ICT projects she undertook with her class describes the way she has implemented ePortfolios in her classroom.

b. Personal Learning Journey
   i. As a teacher librarian, I became involved in using ICT in the classroom by supporting teachers in the upper school develop their programs. I attended the unpacking of the Technology Syllabus in 2004. This made me aware of how to include ICT across the KLAs as a means of gathering, sharing and presenting knowledge.
   ii. The introduction of ePortfolios, 2004, launched a new direction for using ICT for displaying of tasks, assessment and monitoring as well as developing the different software in a meaningful way. I have attended afternoon sessions put on by the ePortfolio Alliance where examples of ePortfolios were shown. As well these afternoons included hands-on sessions on different programs, e.g., front page, PowerPoint, photo story, media and file management. During 2006 I attended the ePortfolio Playground. This was a time to bring your projects and get assistance.
   iii. Examples of ePortfolios I have been involved in have been shown by Dr Tom Otto at a number of his presentations.
   iv. In 2005 I attended the Science and Technology Forum and was part of the presentation ‘The Pedagogy of ePortfolios and Sharing of Stories.’ T. Gillespie and I presented examples of the ePortfolios from the students of Year 5/6.
   v. This year, 2006, I requested to go back on class. Now with my year 6/7 class we are working on our 2006 ePortfolios. Skills are taught as they are needed either as whole class lesson or small groups thus leading to peer tutoring. I have found the level of skills within this class, have improved immensely and the students are very interested in the project because of the use of technology. Children with learning difficulties have excelled and have become eager to learn new skills. Not only have the children been learning but I have also developed my skills through sharing with children and staff and through the network of teachers from the ePortfolio Alliance afternoons and the ICT Pedagogy Licence sessions.
   vi. Today technology is an integral part of my teaching practice. Where possible, I use technology to aid student learning and develop ways of communicating. I look forward to using some of the new skills I have learnt during this course, e.g., chat room, Blackboard and Web Quest.

c. ePortfolio Unit plan
   i. Purpose: For students to create a purposeful collection of work throughout the year, captured by electronic means, serving as an exhibit of individual efforts, progress, and achievements in more than one area.
   ii. The ePortfolio purpose will be
      Formative: learning tool for the student (“Me” section)
      Summative: monitoring tool for the teacher and formal evaluation process for teacher and student (“School” section)
      Marketing: celebration by presenting ePortfolios to parents, friends, peers and other teachers
   iii. ePortfolios will be used to
      To develop ICT skills
      To individually and creatively use ICT’s throughout mini projects
      To present purposeful information to a real audience
      To be used as a reflective tool
   iv. ePortfolios will allow the opportunity for skills to develop in
      file management; photo storage, transferring and reducing of photos; Microsoft PowerPoint, Publisher, Word, Excel, Photo Story 3, Inspiration, Audacity, Word Art and Windows Media Player; hyperlinking; accessing the internet for graphics, information, music and communication; note taking and creating bibliographies; and
      mp3 players, webcams, video cameras, digital cameras and scanners
   v. Outcome Overview
      Students examine knowledge, ideas and data from a range of sources and establish its relevance of this information when meeting design challenges.
      Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.
      Students select and use techniques for generating, modifying and presenting information for different purposes.

When writing and shaping, students: negotiate purposes for writing and shaping, select a relevant genre and medium, consider interests of the audience when selecting subject matter.

vi. Evaluation

Rubric

Peer evaluation

Student self-assessment

Observations throughout year

Reflection on work and overall ePortfolio presentation

vii. Task Presented to Students

To develop, maintain and present, electronically a portfolio of work that shows your achievements for 2006 both academic and personal. A flowchart will help organise your work into the headings: Personal Information; School Projects; and Outside School (interests, sporting achievement).

viii. Orientating Phase

Discuss and display a case study from previous years.

Develop flowchart of ePortfolio contents, e.g., template.

ix. Developmental Phase

Identify known skills of individuals and encourage collaboration and peer tutoring

Develop new skills as required in order to complete task. This can be as a group or whole class, teacher directed or student initiated.

Students continue the development of their ePortfolio throughout the year. Teacher to provide opportunities outside of class time for students.

Students to analyse their own and each others' work throughout the year.

Students will reflect upon their work and achievements using teacher-provided criteria sheets and add these reflections to their ePortfolio.

Parents are encouraged to view the students' work throughout the year.

x. Culminating Phase

Parents are invited to the school for an end of year viewing.

Students' ePortfolios are compiled onto disc and taken home at the end of the year.

d. Assessment Criteria

i. Achievement for each of the following areas recorded on a scale from high to low.
ii. Appearance and navigation are clear and logical.
iii. All links work and media displays as intended.
iv. Images are appropriate for the subject.
v. Text is readable (fonts, sizes and contrast).
vi. Flawless spelling and grammar.
vii. Innovative and balanced use of: graphics, sound animation, additional software, internet resources, video, and audio.
viii. Use of skills in: PowerPoint, Word, Photo Story 3, webcam, mp3, Word Art, Inspiration, file management, Publisher, hyperlinking, and the Internet.
ix. Academic and personal evidence.
x. Evidence organised under appropriate headings.

Me & Outside School

Personal innovation

Shows a variety of experiences

Set as a mini autobiography (Word doc)

School

Displays work from all KLAs

Assessment sheets are included

xi. Reflection.
xii. Evaluation of personal strengths and weakness.
xiii. Overall reflection of portfolio included on last slide (webcam).
xiv. Overall Student Comment.
xv. Overall Teacher Comment.

e. Unit Reflections

i. Year Level 6/7
ii. How the task was developed

Seminar presentation where examples were shown, ideas discussed, technology workshops listed to help learn skills and the benefits for students, teachers and showing to parents were listed

iii. Why this is in my portfolio

It is an ongoing process. Technology use is constantly being developed. ICT is used to collect and complete the task. There is a real life purpose to the task - marketing and communicating their ability to peers, teachers, parents and the community. Reflecting on their learning. The "Me" section shows a child centered powerpoint where skills are developed eg obtaining graphics and technical aid, it allows them to experiment and reflect on their learning of the use of ICT to present self-selected information.

iv. Describe the task

During the year work is collected electronically by the individual. They are to display their work and reflect on it. They are encouraged to share knowledge discovered - skills and presentation ideas becoming the teacher, student and viewer. They have to become familiar with PowerPoint and hyperlinking to other programs. They learn how to use cameras, webcams and scanners to collect and present their work and reflections. The section titled 'Me" allows them to experiment and enjoy what graphics, sounds and different animations they can find and use in PowerPoint. This section is for fun and enjoyment while the other section, School, is to be used as an assessment tool and monitoring tool to be shown to parents when needed (summative ePortfolio).

v. Curriculum Link

All work from the KLAs are collected

vi. What was the central focus of the student learning

What they have completed at school this year presented to parents electronically, collected, organised and reflected on by the individual. Marketing their computer skillls.

vii. What teaching and learning approach did I use and why

At first I was the leader and introduced the project and presented some basic ePortfolios. I discussed a flowchart of ideas (in portfolio) which the children added to and refer back to often. This helps them to understand the hyperlinking process and where to go next. As the project unfolded and skills of the different children were highlighted they become peer tutors, my role changed to facilitator. I am there for the children who need extra guidance,discussion and for troubleshooting.

viii. How was the task assessed

On going observations and viewing of projects to whole class for discussion. As items are completed I either write a reflection for them done electronically or an assessment rubric is added. Students are also encouraged to write a refection. Final assessment by individuals, peers and myself will be completed at the end of year. Overall reflection.

ix. By doing this task, what skills did I develop for myself

Further developed my skills through attending ePortfolio workshops and playgrounds, i.e., afternoon sessions with other teachers doing similar projects and ICT coordinators at Wilsonton Campus, Toowoomba State High School. This is where I have discovered new programs and ways of presenting the work.

x. Why this task was worth doing

Class work had a purpose and audience. It was a way of developing ICT skills that was purposeful and not just lesson orientated. Allowed and made them reflect on their learning. Developed pride in their work as their work was often shown to other classes and to teachers. It was a way of presenting their work to 'show off' their abilities. Their presentations so far display skills beyond my expectations.

xi. Further Reflection

As Teacher librarian I had the opportunity to work with classes on this project and could see its value. At first we had to work on basic PowerPoint skills in small groups. We used ability grouping here so the more able students could become peer tutors. Once basic skills were taught the project ePortfolio was introduced and further skills were taught when needed and when new programs were discovered, e.g., PhotoStory 3. Now I have my own class and could see the benefit of the early skill based lessons (year four). Very few whole class lessons are taught only on needs bases or to display students work. Students from previous years who have an ePortfolio have kept work they did in previous years that they felt reflected their development plus items from the area of their personal life. By having three sections, Me and Outside School being very child centered, allowed the students to be free and a little wild with their presentation. The third section, School, is more directed by the teacher with the children completing tasks with assessment and monitoring views. They understand the purpose is to show parents what they have completed this year.

f. Personal Journal
   i. As this activity is an ongoing task I have kept a journal. I have recorded my ideas on what went well and things I needed to change.
   ii. This is my third year working with the students on developing their individual ePortfolios and I have made many changes. The first being the setting up of their folders and files, i.e., file management.
   iii. This year I spent a number of weeks at the beginning setting up these, showing the students how to manage them, e.g., moving files, renaming files and folders, making new folders. I found that this made it easier for the students to know where to save and if they did save in the wrong place, I could talk them through the steps and not having to take over and complete the task. They're becoming owners of their work and solving their own problems. They have learnt not to delete files before checking if they have placed it in the right place and ask for help not only from me but their peers.
   iv. I developed a flowchart which this year has helped the student see what to include as well as how things fit together. I gave them a template which the students have added to as a whole class and individually. The students who are moving quickly through the task add more content within each folder as well as different folders especially within the areas of Outside School and Me.
   v. This year I have worked on more peer tutoring as often I am the only teacher available for help. I have revised/taught: photo story 3; use of the webcam; and scanning and the transferring of files/folders. At least eight students in the class are very confident in these areas and this has made it easier for me. I can send students to the library where they're supervised and knowing there is help by a peer.
   vi. The major problem we have is access to computers. I will often open up the computer lab during lunch and have two set times for use in the library.

Appendix G: *Success for Boys Project*

1. Initial Planning

a. Summary
   i. C. Zilm (principal, Toowoomba State High School) applied for a Commonwealth grant for a project to improve the success of boys at his school and the cluster of primary schools that send students to his school.
   ii. T. Otto, the principal researcher was principal at Withcott State Primary School, one of the schools involved in the project. T. Otto was asked by C. Zilm to take the role of research manager, and was therefore in a position to apply the underlying principles and instructional design of the Professional Development Framework to this project.

b. Initial Contact with Schools
   i. Email from C. Zilm to principals in the cluster of schools: I have put together an application for $A70 000 for our cluster to access Success for Boys Professional Development Modules and trial some approaches to boys interventions as part of Dr Nelson's [Federal Minister for Education] change agenda. It does not need to be too demanding but will be a great topic for the Middle Phase of Learning plan. It will also allow us to further develop the primary/high school productive pedagogy visits. It will run alongside the science project and add to the resources available to us. Ultimately it will contribute to the resources for mainstream programs, in school/class intervention programs and in school withdrawal programs. It will also provide one or two teachers with good levels of professional development in boys' education and access for all to the core and some elective modules. It will also help us trial and resource some alternative primary and high school intervention strategies for those tougher kids.
   ii. Email from T. Otto to C. Zilm: Have you considered the instructional design and evaluation framework for the professional learning component of the program? The ePortfolio Alliance achieved considerable success with the attached Constructivist Learning Environment (CLE) and Learning Centred Evaluation Framework (LCEF)/Activity Theory respectively. The information required by the latter is quite extensive to meet the purposes of my work, but a simpler version that reflects the basic principles of "design, development, implementation, and institutionalisation" could be adapted. I suppose the key point is that good professional development programs contain all these elements anyway, and these models can serve as a guide so that all the right boxes get ticked. In a climate of accountability and limited $, the models enhance the effectiveness of investments, make processes transparent, and provide reliable outcome measures that may be celebrated and contribute to recurrent funding. The LCEF was developed for exactly this purpose, i.e., to ensure that investments in tertiary projects were achieving desired results. Sources of information for the evaluation of a project such as Success for Boys will be diverse, and will need to consider both qualitative and quantitative oriented data. The LCEF is well suited to this purpose, and as suggested by its title, focuses on the learner and the learning that occurs and evaluation is an integral part of all phases of the project. I have an interest through my study in promoting the CLE as an instructional design and the LCEF/Activity Theory for professional development projects other than the ePortfolio Alliance.

c. Planning Committee
   i. A planning committee was established after a brief discussion about the Success for Boys project at a Cluster Meeting.
   ii. T. Otto spoke to the school administrators who formed the planning committee and presented a document that summarised the Constructivist Learning Environment and Learning Centred Evaluation Framework/Activity Theory.
   iii. It became apparent that it would not be practical for project facilitators to work from the document in its present format. While the principals at the meeting accepted the principles and processes, the document was simplified before any more meetings were to take place.

d. Meeting of the Cluster School Administrators
   i. Prior to the meeting C. Zilm forwarded this email to the Cluster School Administrators: The planning/implementation team for the Success for Boys programme has met and developed a PLAN for presentation on Wednesday. We will call it "the PLAN."
   ii. To genuinely stimulate conversation, we are asking you to PREPARE something for the meeting. It will take about five minutes to complete the following Focus Questions for the START phase.
      Who are the learners in this activity?
      How many teachers will be involved in the program from your school?
      How would you describe their teaching area?
      Why would these teachers be likely to get involved?
      Do boys need to improve their success in our school?
      What would you think would be the focus issue for you as a Principal?
      How would you see the future for boys' success in your school?
      Do you have any data yet to support this view?
      What other things can you imagine teachers wanting to tackle in this programme to improve Success for Boys?
   iii. At the meeting, T. Otto presented the revised document and cases.

2. Initial Plan

a. Rationale
   i. To reflect on boys' performance in schools and increase their success in response to school determined priorities through a professional development activities supported by a teacher network.

b. Participants
   i. Toowoomba North Cluster Project Leader: Christopher Zilm
   ii. Lead School: Toowoomba State High School
   iii. Partner Schools: Fairview Heights SS; Harlaxton SS; Highfields SS; Rockville SS; Toowoomba East SS; Wilsonton SS; Withcott SS
   iv. Participant Schools: Toowoomba North SS
   v. Research manager: T. Otto
   vi. Implementation Team: C. Zilm, T. Otto, M. Bolitho, J. Jones, L. Hill, P. Williamson, D. Saxton, P. Keenan

c. Process overview
   i. Start - presenting the plan
   ii. Design Phase - develop projects, expression of interest process
   iii. Information - Core module, Milestones
   iv. Support - project days, learning, Module Two, The Learning Place
   v. Evaluation - data collection, case writing
   vi. Celebration - publication, sharing, Showcase

d. 2007 Management:
   i. The project is managed strategically by a group of principals who have accountability for the program with DEST.
   ii. Each project teacher is provided with the resources to self-manage the project development and case study. The cluster of teachers involved in the program in turn, supports the teacher and the principal is accountable for the effective use of allocated funds.

3. Workshops

i. All participants attended a two hour presentation on the Core Module, and then elected to attend modules on Boys and ICTs, Boys and Literacy, Mentoring for Success, and Indigenous Boys.

ii. The Core Module was presented at the Highfields Cultural Centre on 26 April 2006 and at the Middle Ridge Golf Club on 4 May, 2006, and was attended by principals, teachers and other school staff. The success of boys is an issue that concerns a whole school, and all staff have a role in developing and implementing strategies.

iii. The module was presented by C. Zilm, with T. Otto presenting the section relating to the plan that it is recommended that each school adopts to develop and implement effective strategies, as related in the next section. The Professional Development Framework (see appendix B) was described and distributed as the Whole School and Individual Action Plans.

4. Planning a Whole School Project

a. Details
   i. The following information was included in an information pack provided to all participants. It is a summary of the key points in developing a school plan in response to the need to improve the success of boys.
   ii. The plan highlights the need for strategies to be devised and implemented from a whole school perspective.

b. A Whole School Project
   i. The implementation of strategies to improve the success of boys requires a whole school approach. One of the factors impacting on the success of boys concerns their interactions with adults and other students, and interventions therefore need to be applied consistently.
   ii. The focus of a whole school approach should be on uncovering pedagogic practices that work and sharing these within the school and beyond. Improving outcomes for boys is a complex issue requiring thoughtful planning and perseverance. Individually and collectively, members of a school staff need to become researchers as they engage with the issue, identify and implement strategies, and collect and analyze data to measure the effectiveness of those strategies.

c. Planning Committee
   i. A small planning committee should be established with at least one person prepared to enact and follow up decisions. The committee has to be committed to improving the success of boys and to sustaining the project over an extended period of time.

d. Action Plans
   i. <u>Whole School</u> and <u>Individual</u> Action Plans (see appendix B) are available from The Learning Place. These plans are based on the five elements of a constructivist learning environment: The Issue; Information Resources; Cases; Tools; and Support. The reflective questions listed below could also be used to generate strategies and activities.

e. Reflective Questions
   i. Who will be on the planning committee?
   ii. What are the specific issues at our school?
   iii. What is our context?
   iv. What do we hope to get out of the project?
   v. What practices are already working well in the school?
   vi. What practices or projects should be trialed and implemented?
   vii. How will all members of staff be encouraged to engage with this issue?
   viii. What data sources do we have already?
   ix. What other data will we need to collect?
   x. How will it be collected?
   xi. What is the data telling us about our boys now?
   xii. What data will we need as evidence that our strategies have improved outcomes for boys?
   xiii. Do all members of staff have access to and can use The Learning Place? If not, what needs to be done?
   xiv. How will staff access information?
   xv. How will staff be supported in understanding the information?
   xvi. How will staff access cases?
   xvii. How will the cases we develop be disseminated?
   xviii. Are there any new tools being used? How will skills in the use of tools be developed?
   xix. What support will staff require in developing and implementing new strategies?
   xx. What activities are planned to introduce staff to new strategies?
   xxi. What incentives will there be for members of staff to be innovative and productive in this issue?
   xxii. How can the project be sustained?

f. Evidence
   i. Student achievement needs to be monitored and assessed over time to determine the value of the pedagogic practices or strategies the school has chosen to implement. A whole school plan should
      increase our understanding of how boys' engagement and learning can be improved;
      identify successful strategies for boys;
      establish baseline data in order to monitor own situation; and
      identify the specific learning needs of particular boys or those students at risk.

g. Data Collection
   i. The reliability of data can be improved if collected from more than one source. Both qualitative data (e.g., observations and interviews) and quantitative data (e.g., results of standardized tests) need to be considered from the following sources.

   ii. National: The Performance Measurement and Reporting Taskforce (PMRT) is responsible for reporting nationally comparable outcomes of schooling. National testing to measure students' reading, writing, spelling and numeracy skills is conducted in years 3, 5 and 7, while national testing for scientific literacy, civics and citizenship, and ICT literacy has been developed for years 6 and 10. See www.mceetya.edu.au
   iii. State: The Education Queensland Corporate Data Warehouse has information for the school in comparison with benchmark data for all State Schools. Like School data is also available with like schools identified according to criteria such as total school enrolments, band level, and Index of Relative Socio-economic Disadvantage.
   iv. School: Sources of information include surveys, questionnaires, interviews, teacher judgements, class assessments and reports, literacy measures, school retention records, results for years 10 & 12, admissions to higher education, attendance data, behaviour incidents, suspensions, expulsions, and student opinion survey data.
   v. Assessment tools include School Entry Assessment, First Steps Continua, Reading Recovery program levels, Developmental Assessment Resource for Teachers (DART), Waddingtons Diagnostic Tests (Numeracy and Literacy), TORCH (Reading Comprehension), and The ESL Scope and Scales.

h. Data Analysis
   i. The value of collected data is limited by the extent to which it is analysed and used to inform practice. Consideration may be given to gender, socio-economic status, cultural background and indigeneity, and the identification of the specific learning needs for individual and groups of boys and students 'at risk.' A whole school evaluation plan needs to consider these elements.
   ii. Purpose: Why evaluate?
   iii. Will the evaluation serve formative and/or summative purposes?
   iv. Audience: Who is the evaluation for?
   v. Will the audience be teachers, parents, students, or researchers?
   vi. Data: What kinds of data are needed?
   vii. What criteria will be used for selection?
   viii. Timing: When is the information needed?
   ix. Personnel: Who will collect the data?
   x. Who will analyse the data?
   xi. Reporting: How will the information be communicated?

i. Reporting
   i. Some points to consider when preparing reports.
   ii. Include commentary;
   iii. Present a fair, accurate, and balanced point of view;
   iv. Ensure that the report is credible and communicable;
   v. Include testimony from the boys, parents, teachers, and other students;
   vi. Provide examples of student work;
   vii. Apply creative thinking in the report writing;
   viii. Include critical incidents; and
   ix. Contextualise the evidence.

j. Cases
   i. A case in the form of a story or image is a record of how new practices have been implemented. By sharing cases, we see practices we may not have previously considered and can see the effects of new practices. Sharing cases is a way of measuring our own progress, and reassures us that what we are doing is appropriate. Preparing and storing cases contributes to organisational memory, so that what we achieve is retained for future use.
   ii. Context: Provide enough detail about your context so that the viewer can interpret similarities and contrasts with their own context. For a case to be meaningful, the viewer has to identify with your situation.
   iii. Issues and solutions: The viewer needs to be presented with enough information to identify with your issues and solutions. Viewers will find it easier to implement a practice if they have seen someone perform the practice.
   iv. Format: Cases provide viewers with perspectives they may not have considered.
   v. Visual aids such as a photo or short video clip are powerful and provide a lot of information quickly.
   vi. Videos can be a problem if children are identifiable, which may not be appropriate even with parental permission.
   vii. In photos, the faces of individuals can be "brushed" to prevent identification.
   viii. A story, perhaps supported by photos, is an old but reliable format. Do not write too much or too little.

ix. A vignette of half a page and a few photos on the rest of the page is often sufficient.
x. A video of a person talking about their work is a powerful format that eliminates the problem of showing children. Viewers respond to the enthusiasm, language, and personal touches of a real person.
xi. Storing and Accessing Cases: Having several strategies to store and access cases allows people to use a method that suits them best.
xii. Create a PowerPoint presentation or a webpage with a brief explanation of each case and a hyperlink to the case.
xiii. Upload the presentation or web page to the school's Intranet or Internet web page, to the project room at The Learning Place set up for each learning project, and save to a CD-ROM for copying and distribution.
xiv. Compile the cases in a booklet with an introduction about the issue, the context, the new practices, and the effect of the new practices.
xv. Case Based Reasoning (CBR): CBR is a reasoning process in which cases are accessed to solve problems, i.e., previous cases and past experiences provide suggestions for solving new problems. There are four steps.
xvi. Retrieve: Access a case that demonstrates a solution to a problem similar to the one you are encountering.
xvii. Reuse: Apply the solution in the case and your own experience to solve the problem.
xviii. Revise: When the problem is solved, a new case has been created.
xix. Retain: Store the new case for other people to access.

k. Curriculum, Pedagogy, Assessment, and Reporting
   i. Whole school involvement in this project presents an opportunity to review the alignment of curriculum, pedagogic practice, assessment, and reporting. For example, assessment should: not be separate from teaching in either time or purpose; be aligned with teaching and learning goals; be an aspect of curriculum design, rather than a process that operates independently; and engage students in self-assessment and peer-assessment. Students need to be encouraged to be specific about their own learning and to identify the steps for improvement and attainment of the next level. For example, they need to understand the concept of criteria, the characteristics or dimensions on which the quality of performance is judged, and that these can be expressed as standards or levels of excellence. Student attention needs to be focused on specifics related to criteria, overall learning goals should be broken into smaller goals, and exemplars used to communicate particular standards.

l. ePortfolios
   i. Paper based and digital or ePortfolios are particularly useful tools to support learning, assessment, and reporting. An ePortfolio is a purposeful collection of work, captured by electronic means, that serves as an exhibit of individual efforts, progress, and achievements in one or more areas. Portfolios encourage learners to take responsibility for their own learning and to be reflective, which is a key tool for transformation and development. A portfolio is a diverse record of a student's achievements, such as results from authentic tasks, performance assessments, conventional tests or work samples, and documents achievements over an extended period of time.
   ii. Careful critical self-evaluation is an integral process and involves judging the quality of one's performance and the learning strategies involved. The student's understanding of what constitutes quality in a particular context and the learning processes involved is facilitated by discussion and reflection with peers, parents and teachers during interviews, conversations or presentations of learning.
   iii. The development of a portfolio involves documentation of achievements, self-evaluations, learning experiences, strategies, and reflective statements. It is significantly more than a collection of assignments. The ePortfolio Alliance is a region wide initiative to facilitate professional learning for the classroom implementation of ePortfolios (contact Dr Tom Otto, Principal, Withcott SS).

5. Evaluation of the Core Module Workshops

a. Details
   i. Participants were asked to complete a written survey at the conclusion of the workshop.

b. How important is it to improve boys' success and why?

Table G.1: Importance of Improving Boys' Success

	1	2	3	4	5	Mean
Highfields				15	63	4.8
Middle Ridge				9	54	4.9
Total				24	117	4.8

   i. Improve the self-esteem of boys
   ii. Changes are not at the expense of girls
   iii. Boys are underachieving and are not engaged
   iv. Boys need to grow up to be happy and healthy and school should be an enjoyable and positive part of boys' growing years
   v. Boys need direction
   vi. These are our sons and our future generation
   vii. Make society better and develop responsible citizens
   viii. Better classroom behaviour and environment
   ix. What is being done now is not working, so we need to do it better
   x. Because we have too many social problems with boys in their teenage years
   xi. Improve retention rates
   xii. Enhance life long learning
   xiii. Girls have been invested in and have caught up which is great, but now boys are beginning to lag behind
   xiv. Teacher sanity will improve
   xv. Improve the 3rs and the new 4th r

c. What new information did you find significant?
   i. The data relating to the issue
   ii. Guiding principles for success
   iii. Concerted, planned attempt to address the problem
   iv. Much of the information was already known
   v. Need to change/re jig what we are doing
   vi. Research approach
   vii. Sharing information
   viii. How boys' lives and school experience clash
   ix. Boys need much more hands-on activities
   x. ICTs are seen as an important tool for boys
   xi. Many people share the same concerns and identify similar avenues to pursue
   xii. Good teaching practice is important
   xiii. Raised awareness of the issue
   xiv. How systemic the problem is
   xv. That boys do want to learn and do like routines
   xvi. Focus on boys, teachers, school
   xvii. What is masculinity
   xviii. The necessity to gather data record relevant information
   xix. Boys own thoughts
   xx. The 'boy' problem is global
   xxi. Pleased to see the issue is being funded and addressed
   xxii. Boys don't mature until 26 years of age
   xxiii. Indigenous boys drop out in year 1 and 2
   xxiv. Data that counters myths
   xxv. Different learning styles for boys
   xxvi. Link to Productive Pedagogies and Professional Standards and other initiatives

d. What will you consider doing differently?
   i. Incorporating experiences to be more hands-on
   ii. Catering for different learning styles
   iii. Be aware of structure of lessons and present rationale to class before beginning instruction
   iv. Giving boys more freedom to move around
   v. Presenting tasks in a competitive way
   vi. Praise with lasting effect
   vii. Asking boys what they want

viii. Be aware of the way boys would like to be treated
ix. Presenting real life problems
x. Listen more
xi. Be more careful with making assumptions about boys' behaviour
xii. Being more aware
xiii. Deliver a better timetable
xiv. Making more time to develop positive relationships
xv. Reflecting more deeply on current practice
xvi. Behaviour Management planning
xvii. Reconsider what constitutes success
xviii. Single sex activities
xix. Use ICTs
xx. Interact with the high need boys as adults instead of reacting to their behaviours
xxi. Enhanced classroom democracy
xxii. More access to student input when planning units
xxiii. Incorporate multi illiteracies
xxiv. Get to know the boys in my class
xxv. Utilise role models more actively
xxvi. More emphasis on multiple intelligences
xxvii. Focus more on literacy
xxviii. Get over the logistical problems of space, resources, ICTs that don't work
xxix. Flexibility and choice in the curriculum
xxx. More group work in class
xxxi. Try to be 'cool'
xxxii. Be less confronting
xxxiii. Analysing the issue through data
xxxiv. Taking more time and being more patient with boys
xxxv. Provide more conferencing time
xxxvi. Be willing to adapt to a more fluid classroom
xxxvii. More scaffolding of tasks
xxxviii. Constant evaluation and assessment will effect change of events positively
xxxix. Use interviews to find out personal view points
xl. Doing personal reflections
xli. Pedagogy - consider particular needs of boys; curriculum - look for relevance; assessment tasks - look for relevance
xlii. Treat boys as individuals
xliii. When boys are finished their school work, have activities and projects they can work on which are interesting, creative and educational
xliv. Record observations
xlv. Not to let it slide into the background
xlvi. Collect more data
xlvii. A solid pedagogy will breed success
xlviii. Think more about the smaller, success opportunities in daily classes
xlix. Remembering if you don't change something, things will stay the same
l. Implement ePortfolios
li. Ensure relevance
lii. Providing a range of opportunities for boys to present their work

e. Has the session provided a workable plan of action?

Table G.2: Evaluation of the Plan of Action

	1	2	3	4	5	Mean
• Highfields	2	3	21	35	8	3.6
• Middle Ridge		2	22	22	9	3.7
• Total	2	5	43	57	17	3.7

i. Good starting point but need to read and digest information
i. Need to talk to the rest of the staff
ii. Resources for the beginner are well organised and helpful in getting started
iii. Thought provoking
iv. Needs coordination at a whole school level
v. The individual action plan is very comprehensive and prescriptive
vi. Provides a workable rubric for brainstorming practical approaches to change reflection

vii. Usual problem of time
viii. Have notions but these have to be actualised
ix. More examples needed
x. Resources were provided to take home and read
xi. We have the plan but how many people will be on board
xii. Motivating

f. Which other modules would you like to attend?

Table G.3: Attendance at Elective Modules

1. Boys and Literacy	100
2. Mentoring for Success	78
3. Boys and ICT	69
4. Indigenous Boys	44
none	6

g. Rate the Presentation

Table G.4: Evaluation of the Workshop Presentations

	1	2	3	4	5	Mean
Highfields		2	16	45	12	3.9
Middle Ridge		1	13	33	12	3.9
Total		3	29	78	24	3.9

i. Preference for time to process information, presenters not reading slides, practical hands-on activities, practical examples, slow pace, interactive activities, ease of viewing screen, slide colour other than light blue
i. Appreciated that the session inspired teachers to change their pedagogy, was researched, reflected current beliefs and philosophy

h. Rate the venue and meal

Table G.5: Evaluation of the Workshop Venues and Meals

	1	2	3	4	5	Mean
Highfields			11	16	48	4.5
Middle Ridge			4	30	24	4.3
Total			15	46	72	4.4

i. Highfields: Comfortable, excellent AV, delicious meal, extravagant event for EQ staff thanks to Commonwealth funding, unobtrusive service
ii. Middle Ridge: Excellent meal, needed coffee, problems seeing data screen, too noisy (teachers talk too much), a little squished, great service

i. Other comments
i. Great to have primary and secondary at seminar together
ii. Good introduction to issues
iii. Very energising evening
iv. Great to see so many people at this event
v. Enjoyed being out together as a staff
vi. Challenging
vii. Interesting
viii. Big issue, broad inputs and a co-ordinated and targeted approach to workable solutions
ix. Need speakers who have done things in this area
x. Providing a meal makes us feel like professionals. Thanks for treating us as business would!
xi. Need to do pre-reading

6. Withcott State School

a. Success for Boys
i. The following note was distributed by the researcher/principal to staff in May, 2006 about the proposed actions for Withcott State School.
ii. Thank you for attending the “success for boys” core module. I know that many of you will be attending the optional modules, but meanwhile we can make a start on the project. I would like to acknowledge the work that has already been done in this school over many years, and for various other reasons this issue is probably not as significant as elsewhere.

iii. The first step is to address two questions.
   Is the success of boys an issue at Withcott State School?
   If it is, what is the extent and nature of the issue?
iv. The best way to answer these questions is through the collection and analysis of data. There is no need to knock ourselves out in this process, so let's try to work it in with what we do already. I suggest we try to accomplish this task between now and the end of the semester so that it has a starting point and an end point.
v. The table below provides suggestions on how and where to collect data. Please share your ideas on other data sources.

Table G.6: Data Collection at Withcott State School

Data Source	Who	Comments
Year 3, 5, 7 Tests	T. Otto Principal	Print off results from the Corporate Data Warehouse for the past few years and look for patterns.
Literacy/Numeracy	Learning Support Teacher	Review test results for the children who had intervention this year and last year and investigate patterns.
Whole class screen tests	All teachers	Review any whole class screening results, e.g., Torch, and identify patterns.
Observations	All teachers	Observe boys and girls while at work and play, e.g., prepare a running sheet of anecdotal comments on a particular student that you keep adding to for a day. Do this for some boys and girls and draw comparisons, or On a sheet of paper break a period of the school day into 5 minute slots. Tick if the child is on task (observe boys and girls).
Class Tests Reading Running Records	All teachers	Compare results for boys and girls.
Report Cards	All teachers	On completion of report cards this semester, compare results and comments for boys and girls and comment on patterns.
Reading Groups	All teachers	Count how many boys are in the various reading group levels (or RR levels) in your class and compare with the number of girls.
Interviews	All teachers	Talk with individual boys, groups of boys, and all boys in your class. Conduct similar talks with girls and compare results. Watch that children are not supplying the answers they think you want.
Interactions	All teachers	Jot down informal interactions with children in class and in the playground.
Questionnaire	All teachers	Prepare a list of questions that boys can respond to in writing. Responses may be different to interviews as they will have more time to consider answers and will not be influenced by peers.
Observations	Aides	Record observations while working with small groups or on play duty. Discuss observations with the class teacher.
Detention Records	T. Otto	Review detention records.

vi. The results of your observations and analysis of patterns need to be collated. The easiest way to achieve this is to give them to me on a piece of paper as soon as they are done and I will add them to an ongoing collection sheet. For example, you have done some observations over a couple of days. Write comments at the bottom of the observations as your interpretation of what is happening and hand a copy to me. It doesn't have to be particularly neat or well presented. The main thing is to collect the information and have it collated so that we have an overall picture for the school.
vii. Later on when we are thinking about intervention strategies we will be focusing on: the boys themselves (a) sense of self (b) relationships (c) cultures; teaching; whole school practices; and the effect on individuals at risk; groups of boys at risk; and all boys.
viii. It would be appropriate for the data collection to also focus on these elements, or at least keep these in mind when collecting data.

b. Sample Data: Year 3
   i. Reading Recovery: Boys in Year 2/3 are performing above and below the expected levels for their age and class level. Some Year 2 boys are performing at higher levels than those in Year 3. While there is a steady movement to higher levels since term 1, it is interesting that some boys have advanced more than two levels. At a glance it appears that the children reading at the highest levels in each cohort are both girls and boys.
   ii. Spelling: Weekly spelling tests show that children who achieve approximately 50-70% are mainly boys. However, the small number of children who achieve high results of approximately 90-100% are mainly boys as well.
   iii. Spelling Age and Reading age: The children with the highest spelling ages, compared to chronological age, appear to be both boys and girls.

iv. Attitudes to school: A simple survey of likes and dislikes indicated differences between boys and girls. Most girls than boys chose “always like and sometimes like” and more boys chose the range “sometimes/hardly ever/never.” Most boys noted sport and games as their favourite thing at school, and their least favourite things ranged from getting hurt, not having friends, having to do work, and having short playtimes.
v. Ideas for Success for boys initiatives: I feel opportunities for leadership and a public speaking programme throughout the school is a way of nurturing positive attitudes to school and building self-confidence in both boys and girls.
vi. Suggestions: We could allow more children to participate on parades in the role of reporter, for example Sports reporters, class reporters, library reporters, student council reporters. Year 7 children could all have a turn during the year. They would only need to say or read a couple of sentences, each week or every other week, depending on what staff require. I know the year 6 and 7 teachers already do an amazing amount of work with these kids in terms of band, choir, sport etc, so I am more than happy to help the kids prepare, gather info from relevant sources and practice beforehand so they are mentally prepared and have a few PS skills, such as look at the audience, speak loudly so you can be heard etc If this became a Year 7 “job” or even a Year 6 “job” it would inspire the younger ones to listen to and learn from their “leaders’.
vii. Another activity could be very simple weekly or monthly presentations on parade of children‘s work in form of art, poems, story writing, technology work etc. so that children can enjoy the successes of others throughout the school.

c. Sample Date: Year Seven
i. Are the boys and girls in Year Seven treated differently in the classroom?
ii. Boys: Everyone treated fairly; teacher nicer to girls; girls get more chances; don’t answer as many questions; more mature so get treated better; are allowed to talk more; get let off more; boys get punished more; and not allowed to talk as much as the girls.
iii. Girls: Treated the same; I can’t see anything different; because the boys muck up more; only because of our behaviour; girls don’t get into as much trouble; some of us are smarter so we are treated differently; boys get yelled at, girls get spoken to; and girls are given more chances.
iv. Are the boys and girls in Year Seven treated differently in the playground?
v. Boys: Girls are treated nicely, get away with more, get more chances, respected more by teachers, don’t get into trouble when they misbehave, get warnings; given advantages; and take over and hurt us but we just go to touch them and we get into trouble.
vi. Girls: Boys are rougher and girls talk and play nicely; boys get into trouble more and get punished more; girls just get told to stop but boys get a lecture; and sometimes the boys won’t let the girls kick the footy.

7. Final Report Summary

a. Details
i. The following report was submitted to the Australian Government to account for funding and project outcomes.

b. Modules implemented
i. Core Module delivered by C Zilm and T Otto at Highfields Cultural Centre (105 teachers) 26 April and Middle Ridge Golf Club (176 teachers) 4 May
ii. Participants were issued with a Certificate of Attendance and information in written form about the further sessions, ongoing access to modules and online learning opportunities
iii. Mentoring for Success Module presented on 23 May at Toowoomba SHS (35 attendees).
iv. Indigenous Boys Module presented on 31 May at Wilsonton SS (45 Attendees)
v. Boys and Literacy Module presented on 15 June at Toowoomba SHS, Wilsonton Campus (38 attendees)
vi. Boys and ICTs Module presented on 26 July at Highfields SS (45 people)
vii. For each of these elective modules, the materials were presented and discussions formed the focus for further project development using the project scaffolds.

c. Professional learning
i. Professional learning means the implementation of strategies to improve the success of boys required a whole school approach. One of the factors impacting on the success of boys concerns their interactions with adults and other students, and interventions therefore need to be applied consistently. The focus of a whole school approach was to uncover pedagogic practices that work and sharing these within the school and beyond.
ii. Improving outcomes for boys is a complex issue requiring thoughtful planning and perseverance. Individually and collectively, members of a school staff need to become researchers as they engage with the issue, identify and implement strategies, and collect and analyze data to measure the effectiveness of those strategies.

d. Planning Committee
   i. A small planning committee was established in each school with at least one person prepared to enact and follow up decisions. The committee is committed to improving the success of boys and to sustaining the project over an extended period of time.
e. Action Plans
   i. Whole School and Individual Action Plans are available from The Learning Place. These plans are based on the five elements of a constructivist learning environment: The Issue; Information Resources; Cases; Tools; and Support. Reflective questions are provided to generate strategies and activities.
   ii. Student achievement needs to be monitored and assessed over time to determine the value of the pedagogic practices or strategies the school has chosen to implement. A whole school plan is characterized by the intention to: increase our understanding of how boys' engagement and learning can be improved; identify successful strategies for boys; establish baseline data in order to monitor own situation; and identify the specific learning needs of particular boys or those students at risk.
f. Data Collection
   i. The reliability of data can be improved if collected from more than one source.
   ii. Requires both qualitative data (e.g., observations and interviews) and quantitative data (e.g., results of standardized tests).
g. Data Analysis
   i. The value of collected data is limited by the extent to which it is analyzed and used to inform practice. Consideration may be given to gender, socio-economic status, cultural background and indigeneity, and the identification of the specific learning needs for individual and groups of boys and students 'at risk.'
   ii. A case in the form of a story or image is a record of how new practices have been implemented. By sharing cases, we see practices we may not have previously considered and can see the effects of new practices. Sharing cases is a way of measuring our own progress, and reassures us that what we are doing is appropriate. Preparing and storing cases contributes to organizational memory, so that what we achieve is retained for future use.
h. Significant outcomes
   i. Teachers have significantly increased understanding of how boys' engagement and learning can be improved. They are engaging with students in their classrooms on a level not experienced in the past.
   ii. We are developing a collection of cases that identify local successful strategies for boys.
   iii. We are using data in more meaningful ways.
   iv. Boys who are at risk are having significant interventions as a result of improved identification.
i. Significant issues or challenges encountered
   i. Meeting times and keeping the focus on pedagogy discussions.
j. Future projects or follow-up activities
   i. We are still working on refining our projects and collecting interim data on the success of the variety of initiatives in place.
   ii. The development of case studies and sharing/celebration is time lined for early 2007.
k. Distribution of Funds
   i. Consultants ($A17000): Provided support for principals who delivered the module sessions for teachers. It covered time for the principal, print materials and venue.
   ii. Teacher Release ($A28000): Teachers who participated in the Core Module sessions were eligible to participate in the further modules. They then indicated their willingness to develop a project and the funding for this category was distributed per capita to the schools to supplement their own funds.
   iii. Incidentals ($A11000): Included the production of materials for the Core Module session, meal and venue hire.
   iv. Implementation/Embedding ($A14000): Schools were provided with the opportunity to develop projects and apply for this proportion of funding to resource them. Ongoing support and peer discussions were also funded by this element. School visits were also included.

8. Success for Boys Project - Tara Cluster of Schools

a. Details
   i. In May, 2007, T Otto accepted an invitation to present the Success for Boys Core Module for the cluster of schools based in the Tara district. This was an opportunity to apply the Action Plans with another group of participants.
   ii. In August 2007, T Otto visited Meandarra and Tara to present the ICTs & Boys module.

Appendix H: *ICTs in Mathematics Project*

1. Introduction

a. Relationship to this Research Study
   i. The Regional Technology Manager procured funding for an *ICT in Mathematics Project* during 2006 and invited T. Otto to present sessions and to guide the instructional design of the project.
   ii. H. Thomson was appointed as the project co-ordinator, and on the advice of T. Otto designed the online project room around the five elements of a Constructivist Learning Environment (Jonassen, 1999).
   iii. H. Thomson was a teacher at Wilsonton State Primary School and attended ePortfolio workshops. She presented her work on ePortfolios at one of the workshops (see appendix F.8.C).

b. Advice to Schools
   i. The Regional Technology Manager provided the following advice to schools about the *ICTs in Mathematics Project*.
   ii. The Darling Downs-South West Queensland Region has developed a project based on the inclusion of ICTs in Mathematics.
   iii. Planning for this project has been aligned with *Smart Classroom* initiatives from both central office, regional office and district offices and we are pleased to offer this ongoing Professional Development for 12 representatives from each district. Participants in this project will develop an ICTs in Mathematic project of their own choosing. Initial Professional development is offered with a one and a half day program that focuses on Learning Place tools and available online mathematic projects. It will expose participants to other ICT in mathematic possibilities including Learning Objects, Producer, and Web Quests. Participants will utilise the elements of a Constructivist Learning Environment to develop a project to implement into their classroom. Ongoing support is offered through a .2 Full Time Equivalent (FTE) facilitator for participants. Ongoing project implementation/development occurs in term 3.
   iv. This integration of ICTs into the teaching of mathematics project is designed to enhance teachers' knowledge in the area of the use of various ICTs into the pedagogy of mathematics, as well as the ability of students to use ICTs to demonstrate what they know and are able to do in mathematics
   v. It draws on contemporary research and will enhance teachers' knowledge and skills about the use of ICTs in Education Queensland schools. This project contributes to the Department's *Information Strategic Plan 2004-2007*; in particular the goal to "improve staff and student capacity to manage and learn through ICTs." The Smart Classrooms strategy is founded on the Information Strategic Plan 2004 – 2007. The overriding aim of the Smart Classrooms strategy is to make ICT integral to learning.
   vi. The project will facilitate the development of curriculum, pedagogy and assessment that utilises ICTs in Mathematics and/or Numeracy. Action learning and the development of sustainable professional learning communities will underpin the projects in all clusters.
   vii. Participant Criteria: Have good ICT skills; are willing to share their learning with other teachers; and be willing for their cluster of schools to utilise their ICTs in Mathematic skills for schools within their cluster.

c. Sessions Presentation
   i. H. Thomson presented the following information in a PowerPoint presentation during sessions of the *ICTs in Mathematics* project
   ii. Title: Technology & Teaching Strategies Using ICTs, Heather Thomson
   iii. The Issue: Student-centred learning, and real life problem solving tasks. Teachers role facilitates, inspires and challenges the students to link, learn and build on their knowledge to complete a meaningful real life task. ICTs are an integral part of that process, connecting a wide range of students with a range of experiences, possibilities while helping them to apply knowledge to a range of situations, inspiring a love of lifelong learning. Through the linking of technology to a variety of open ended tasks, students are encouraged to use a range of representations from concrete materials to mathematical models, make connections with other curriculum areas and make sense of life experiences or seek solutions to problems.
   iv. Changes in Practice: What will I need to do that is different? How does this differ from the old, e.g., pencil and paper or computer?

v. The Learners: Who are the learners and what skills and experiences do the learners have that will help them implement the new practices, e.g. prior knowledge, program and Mathematical understanding? How will learners be engaged by the issue, e.g., what do we do and how do we engage the learner?
vi. Information: What information will I need and how will I access information, e.g., as facilitator, what else do I need to know (Computer Program, Syllabus etc.)? How can I access support in understanding the information, e.g., who can I access that can help if I need it?
vii. Cases: What do you want your learners to learn? What is the central focus of the learning?
viii. Tools: Will you be using a new tool, e.g., Communication, Thinking or Physical Tools (Blogs, Inspiration, Computer etc.)
ix. Support, Strategies & Actions: Who will I work with? What support will learners need and who will provide learner support?
x. What steps do I take to trial the changes in practice?
xi. Data Collection: How will I know the changes in practice made a difference, e.g., conduct student interviews, surveys and check demonstrated learning outcomes through work samples?

2. Interview with the Co-ordinator

a. Transcript of an interview with H. Thomson, Project Co-ordinator

i. T. Otto: I want to focus on two things, the design of the online learning and how you got on with putting it all together, how people have responded to it, and the pitfalls and advantages of it, and your own personal journey of developing ICT skills. Perhaps start with having a look at the online project room.
ii. H Thomson: For me as a facilitator, it was so easy to, the way it was set up, so easy for me to gather information and put it in its various spots and all the tools were easily identifiable and I could put in the relevant information teachers may need. To me it was both a really valuable learning tool to know what would be needed and a valuable tool for them to access while they were improving their ICT skills as well. It was so easy to find things, so easy to put them in the relevant pockets, it made things very easy.
iii. T. Otto: Was there any part you could have done without or did it all come together as a whole unit?
iv. H Thomson: For me it came together as a whole package and I added a blog for discussion. As with everything there are a lot of lurkers in the background and a lot of people who look but don't say anything and the people who actually did contribute found that a little bit difficult in that they were talking but others were not responding. So that part of it was difficult. However it was valuable for those people who used it and it was valuable for people who were lurking because they could see that they were not the only people having problems. So that was a really valuable tool. But everything fitted in beautifully, the resources, the tools, all of those sections that we used were just so valuable. As I said putting in the relevant resources and the learning tools they may need and the readings and all those sorts of things that they would be able to use in their journey.
v. T. Otto: That's a pretty common phenomena though, when we go to meetings we sit back and let the other people ask the questions, and I've been on a lot of online discussions myself and while I might take a great deal of interest in what is said it just means I don't feel like contributing if someone else is going to do it for me.
vi. H Thomson: I'm a little bit like that myself. I know with the ICT Pedagogical Licence I was a bit hesitant to write anything myself.
vii. T. Otto: Were there any comments from the participants about the structure of it?
viii. H Thomson: The only comment was not relating to the design but rather access to The Learning Place as it was undergoing change and they were modifying it, and they were probably reluctant to go back and use it again because of that fact. But most people that I spoke to really found it was useful and really valued the tool. Because I had time to actually look for resources I could put them in the relevant places. That allowed them to find it because they don't have the time as classroom teachers to access all this stuff but I had the time to find it, pop it in the relevant places and they knew exactly where to go, so it was a really time saving device for them as well because they knew there was quality stuff there.
ix. T. Otto: Have you got any idea about the level of access?
x. H Thomson: People really struggled with finding enough time to do everything in one given day, so time wise it was very. However, if people were struggling to do something, like a web quest, they went into this site and they could access information that I put on it. What I am saying is that they found it time consuming but they knew where to look if they were stuck. They'd email me and I'd say look it is in the project room under information or tools or whatever and they could find it straight away.

xi. T. Otto: It worries me when people use that excuse of time, though I suppose the reason this worked is because you were taken off teaching for one day a week and we expect people to do it as part of their everyday time at school, and they just won't do it.

xii. H Thomson: This has been a really amazing learning curve for me Tom, and as a teacher I have an absolute passion for all this and I feel it is so important and such an integral part of our teaching and best practice. I guess I came into this position feeling that everyone was on the same page. However, not so. Like me, I would spend time at home sourcing out a resource that I would use, but that is me, but others do not do that. So me being able to pop it into the site and link it to what they doing was a really valuable tool.

xiii. T. Otto: What about the longevity. What I want from this program is for someone else to be able to pick it up later. Do you think that is going to happen? Or when you fade away through funding or whatever, the project fades away.

xiv. H Thomson: I would like to see it continued, but I suppose I look at it through slightly rose coloured glasses and I figure everyone is on the same page as me. This role allows me to go out and visit people that I would not have ordinarily done and that was something I wanted to do because I wanted them to have a positive experience in using ICTs in everyday teaching. So I guess I took it upon myself to say can I help you. People who do not have ICTs skills find this structure a little overwhelming so getting out there and working with people on a one-on-one basis was really valuable because they came away felling this is easy, it's attainable, and something I can do. I went to a school the other day and the poor lady had so many hassles and said I am not going to get this project done. So I went out and met with the principal and said we really want this to happen and spent a day with her. She already had substantial planning underway for a board game but she had not put the ICT component into it because the skills that she had were devoid of ICT. So I said why not use a progressive journal and this can be put on the computer by the children at the end of the lesson. They already have their written plan, but they will need to think about how they will get that plan on the computer. That was something she hadn't thought of, and it was like a light had switched on. So I suppose you need some of both, with the online component and someone like myself who can offer some assistance for those who need it.

xv. T. Otto: It must be more efficient as you can reach out to more people online.

xvi. H Thomson: Absolutely.

xvii. T. Otto: But some people need a little kick along.

xviii. H Thomson: That's right, for example it was thought people were reading emails but it was not the case.

xix. T. Otto: The most important outcome is improved outcome for children. Do you think that has happened?

xx. H Thomson: Absolutely. Every single person that I've worked with, everybody has said the children have just loved it. They are going to take what they have done, revamp it and reuse it. And the teachers have grown professionally from using it.

xxi. T. Otto: There would have been teachers who grew more than other. Would you like to comment about that?

xxii. H Thomson: There were some who had very little skills basically revolving around word processing skills and there were other people who had developed web pages. Those who had just used it for word processing found out how they could use it in other ways and enhance the use of the program and the skills of the children. This one teacher used Word to draw tangrams and was just so happy about what she had achieved. People thought they had to produce a whiz bang project but this has taught them they don't have to and they can use ICTs in easy simple ways they wouldn't normally think about.

Appendix I: Regional Professional Development Projects

1. Introduction

a. Details
   i. T. Otto forwarded reports to the Executive Director (Schools) (EDS) in Toowoomba and The Downs Education Districts to promote the activities of the *ePortfolio Project* and to demonstrate the viability of a constructivist learning environment as an instructional design for professional learning (see appendix D.28).
   ii. The Professional Development Framework (PDF) was adopted for projects in the Darling Downs-South West Queensland Region.

b. Initial Meeting with Executive Director (Schools)
   i. T. Otto made an appointment to visit the EDS, Toowoomba Education District in November, 2005 to discuss the application of the Professional Development Framework (PDF) in other learning projects in the district.
   ii. The EDS had just been requested by the Regional Education Director to chair the Regional Professional Development Committee, and was seeking a framework on which to base professional learning in the Region (made up of four education districts).
   iii. A Professional Development Co-ordinator was recently appointed and T. Otto was asked by the EDS to mentor her and develop the PDF.
   iv. The areas for development were to be quite diverse and included introducing the preparatory year, the middle and senior phases of learning, implementation of syllabi, literacy, assessment and reporting, as well as projects involving school and district support staff.
   v. T. Otto was to collate information on key concepts in professional learning. Small, committed planning committees were to be established for each of the areas of development. The committees were to be trained in the PDF and be supported through the design and development phases.
   vi. As a principal in the region with 30 years experience, the researcher believes this is the first time that a systematic approach to professional development has been adopted by the region.

2. Development of the Professional Development Framework

a. T. Vriesema was appointed as Professional Development Coordinator, Darling Downs-South West Region.

b. T. Vriesema and T. Otto met several times and communicated by email to refine the PDF as a practical response to the conceptual frameworks of the Constructivist Learning Environment (Jonassen, 1999), sources of information that influence teachers confidence in adopting new practices (Bandura, 1986), and the Learning Centred Evaluation Framework (Bain, 1999).

c. The PDF had to be presented in a format that could be understood by facilitators. A list of principles and explanations for concepts was compiled. Facilitators could respond to questions in an action plan that included the four phases of a project.

d. As research manager of the Success for Boys project, T. Otto participated in meetings of the planning committee. As an outcomes of these meetings, it was decided that individual participants in a project be provided with a reflection or planning document. This document was compiled and included information about professional learning that would be relevant to participants.

3. Facilitators' Day

a. Details
   i. In April 2006, a whole day workshop was funded to train facilitators of the various region wide projects that were currently being undertaken or planned to be undertaken.
   ii. T. Otto was allocated time at the workshop to present the Professional Development Framework and Facilitator Action Plan (see appendix B).
   iii. The content of the presentation is as follows.

b. Ten Principles of Effective PD
   i. Content is Integrated with other Initiatives and Practices
      Fits everything else
      Individual and organisational needs are balanced

ii. The Approach is Systematic
   Sustained
   Responds to complex issues
iii. Teachers become Researchers
   Stimulates intellectual development & professional conversation
   Motivates life-long learning
   Learners are responsible for own learning
iv. Teachers become Learners
   Requires time and effort
   Delivery: recognises differences & strengths; is flexible, has incentives; recognizes success; and guides and facilitates
   Helps learners cope with new expectations
v. Beliefs are Challenged
   What is a teacher?
   Importance of new knowledge
   What is? What could be?
   Observe, persuade, enact & affective states (see, hear, do, care)
vi. The Focus is on Pedagogy
   Outcomes for students
   Exemplary practice
   Reflects on student work
vii. Learning is Contextualized
   Relates to a real life context
viii. Learning involves the Community of Practice
   Localized
   Communication & collaboration
ix. Technology is Used
   Improve productivity
   Telecommunications
x. Learning is Undertaken in a Supportive School Culture
   Rewards risk takers
   Supports learners
   Encourages willingness: to participate; to deprivatise practice; and to contribute to peer learning
   Administrative and district support

c. Theories of Learning

Views of Knowledge

Traditional transmission instruction ⟷ Constructivism

d. Instructional Design: A Technology Enhanced Constructivist Learning Environment (CLE)
   i. The Issue: issue, learner, context, new practice, & engage the learner
   ii. Information Resources: support understanding, learner selected
   iii. Case Library: case-based reasoning, prepare new cases
   iv. Tools: support skill development in physical, thinking & communication tools
   v. Support: implementation & collaboration
e. Project Phases
   i. Design: Investigate & Plan Activities
   ii. Trial: Trial & Reflect
   iii. Implement: Modify, Implement & Reflect
   iv. Institutionalize: Sustain, Monitor & Share
f. Main message
   i. A CLE is a concept. What is important is what people carry around in their heads!
   ii. The goal of learning is to change behaviour by
      Engaging
      Supporting
      Sustaining

4. Regional Learning and Development Reference Group

a. Details
   i. T. Otto was invited to join the Regional Learning and Development Committee, with the first meeting of the reference group held at Chinchilla in February, 2006.
   ii. The meeting are attended by one or more EDS, Principal Performance Officers from each of the four districts, and representative principals.
   iii. T. Otto has continued to attend these meetings held each term.

b. Purpose
   i. The following statements encompass the roles of the Darling Downs-South West Queensland Regional Learning and Development Reference Group.
   ii. Capturing of data - includes accountability data as well as school based data for future planning and evaluate the success of programmes.
   iii. Use of a regional perspective for all learning and development related activities.
   iv. Provision of direction of Learning and Development in collaboration with the relevant EDS.
   v. Representation of their Districts - listen and advocate.
   vi. Ethic of "working smarter" across the Region using the four Districts.
   vii. Recognising the uniqueness of our Region.
   viii. Bringing of Local District power to a Regional perspective. This includes the accountability of the Region back to the relevant Districts,
   ix. Avoiding of duplication - strive to improve current activities and practises.
   x. Discussion of issues affecting District schools.
   xi. Monitoring of "sustainable" projects to achieve improved outcomes.
   xii. Facilitation of learning for the whole of Education Queensland's DDSWQ regional workforce.

c. Principles
   i. At the June 2006 meeting of the committee, T. Otto gave a presentation on the Professional Development Framework and the Facilitators Action Plan.
   ii. The philosophy of the group is underpinned by the principles of a constructivist learning environment.