Principals' Beliefs about Teaching with ICT: A Model for Promoting Change

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Abstract: Principals have important leadership roles in relation to teaching with ICT. Their approaches are inevitably influenced by personal beliefs. Using case study methodology, this study found that principals' beliefs reflected their long experience. A model for challenging those beliefs with alternatives is proposed as a guide to assisting school leaders in their response to ICT.

Introduction

Although the ICT skills of both teachers and children have increased in recent years, much of the learning about and application of ICT is occurring outside the classroom and the apparent impact of ICT on teaching and learning in the classroom is limited (Meredyth, Russell, Blackwood, Thomas, & Wise 1999). Nevertheless, changes in teaching and learning are occurring in at least some schools. Moreover, successful or *productive* pedagogies are characterised by "intellectual quality, connectedness, supportive classroom environment, and recognition of difference" and benefit from a strong leadership focus on pedagogy which is not widely evident (Department of Education 2001). Where such developments in pedagogy involve the application of ICT, the efforts of teachers are not characterised by mere technical competence with ICT but involve deeper understanding of pedagogical issues (Cuttance 2001).

A case has been made previously for the significance of the leadership role of school principals in the integration of information and communication technologies (ICT) into teaching (Otto & Albion 2002). Schiller (2002) argued that at least part of the class to class and school to school variation observed in the implementation of ICT may be explained by differences in the way principals undertake their responsibilities. Other studies have found that variations in pedagogical practices with ICT are strongly dependent on school leaders' vision for and understanding of the role of ICT (Yuen, Law, & Wong 2003).

Effective leadership is a critical element in the success of schools seeking to implement change and leaders require ongoing development and support (Calabrese 2002). Current understandings of leadership do not assume that leadership is concentrated in a single individual or even a small group. Concepts such as "parallel leadership" promote the sharing of leadership roles more widely in the school (Andrews & Crowther 2002). In their study of the impact of leadership on technology outcomes in schools, Anderson and Dexter (2000) treated technology leadership as a characteristic of the school rather than of an individual such as a principal. They concluded that, although infrastructure is important, leadership is the critical element in establishing technology as a part of school culture.

The study described in this paper sought to increase understanding of the roles of principals in the integration of ICT, their preparedness for change and their future developmental needs in the expectation that such understanding would inform efforts to provide more effective development and support for principals (Otto 2003).

Principals' efforts to lead and manage the integration of ICT in their schools are subject to significant challenges. Ertmer (1999) characterized barriers to integration of ICT as first order (external, institutional) or second order (internal, personal). First order barriers are being addressed through development of ICT resources, infrastructure and even skills. However, second order barriers are more difficult to address and appear to be receiving less attention. Teachers' visions and beliefs are important influences on how they work with ICT (Albion & Ertmer 2002) and the same might be anticipated for principals. Hence, in seeking to understand the roles of principals in relation to ICT, the study identified three research questions:

1. What beliefs do a sample of principals hold about teaching with ICT?
2. What are the influences in the formation of those beliefs?
3. How confident are the principals in rationalising and articulating the educational value of teaching with ICT?

A case study methodology was selected in order to facilitate open exploration of the complexity of the phenomena rather than a narrow focus on predetermined features. Three non-teaching male primary (elementary) school principals, including the first author, participated in the study. Data from each participant were collected during three sessions conducted over a period of two months using a variety of techniques including questionnaires based on published studies, structured interviews stimulated by video of teachers working with ICT, document analyses and unstructured interviews in which participants reflected on their responses to other parts of the data collection process. Written responses, relevant documents and transcripts of interviews were transferred into word processor files where they were analyzed by assigning codes to fragments of text and comparing within and between cases.

Results were reported as narratives structured around key concepts that emerged from the research questions and cross-case analysis. Key sections in the narratives related to beliefs about teaching with ICT, influences on the formation of those beliefs and personal confidence in relation to ICT. Although there were notable differences in the individual responses of participants, there were also many common features in their narratives and a summary of shared beliefs was extracted from the narratives. Consideration was also given to ideas that were not expressed. For example, although each of the participants worked in a school with a substantial enrolment of indigenous children no mention was made of the special needs of these children or others from different cultural backgrounds.

Case Descriptions

The following case descriptions summarize the data obtained from each of the participants. Much of the detail has been omitted but the general structure of the descriptions and the key ideas have been preserved.

Case 1 - Robert

Robert has been a teacher for 17 years and is now principal of a school with approximately 400 children enrolled in years P to 7 and 23 teaching staff. The school serves a predominantly low socio-economic area. Up to 30% of the families have no member in paid employment and 30% have a single parent. There is up to 25% turnover in pupils each year.

Robert indicated a preference for constructivist approaches to learning and active classrooms in which teachers act as facilitators. He recognizes the special challenges of providing for students in relatively disadvantaged communities and the need for schools to provide opportunities and experiences that children might not otherwise have. Although he agrees that ICT will change the nature of teaching he sees limits to the benefits and recognizes the particular difficulties of his community where most children have very limited access to ICT outside of school.

Development of children's basic knowledge and skills is important to Robert and he has initiated several programs to promote literacy and numeracy outcomes. ICT provides an additional context for "real life" application of basic skills rather than a venue for skills development. He is managing a change from a fairly traditional subject-based curriculum towards an integrated outcomes based curriculum. In this new approach

ICT is to be built into each of the curriculum units and would also have a role in the achievement of social and community outcomes by supporting cooperative learning in the classroom and beyond.

In Robert's view, although there is still some value in drill and practice software, ICT should be built into other activities rather than being treated as an "add on" and is of most value for students from the third or fourth year of schooling. Computers in the school are mostly located in classrooms, with two computers in year one and two classrooms and four to eight computers per classroom for the later years. There are also five computers in the library. Robert believes that having computers in both classrooms and laboratories would be ideal but that with limited resources classroom placement provides more flexibility for integration. The school has plans for expanding and updating ICT resources and for systematic professional development and support for staff.

In relation to his beliefs about ICT, Robert values the opinions of professional colleagues but is prepared to make up his own mind in relation to needs within his school. He is supportive of his staff and their efforts to support personal and organizational changes for improved learning outcomes. He has had no professional development related to ICT in the past two years but thinks that he is managing to keep abreast of developments. He takes a small group of year 7 students for a class each day and uses the Internet to support problem solving. He also relieves teachers several times a week and occasionally uses ICT in those classes but has had limited success because of technical difficulties and limited personal skills with ICT. He is not especially confident talking about planning to teach with ICT but is more confident with management applications of ICT. He uses email, word processing, PowerPoint and the Internet for school management purposes but makes little use of ICT outside school except for Internet banking.

Overall Robert likes to see ICT used by children in class and has supported the acquisition of equipment and infrastructure. He sees benefits in constructivist approaches to learning but his beliefs about knowledge and use of ICT to enhance existing practices suggest an alignment with a traditional approach to teaching. Although he speaks with confidence about his beliefs he admits that ICT is not an area of strength.

Case 2 - Charles

Charles has been a teacher for over 30 years and is currently principal of a regional city school with a teaching staff of 18 and 340 children from P to 7. Families at the school are predominantly of low socio-economic status and there is a substantial indigenous enrolment.

Charles did not indicate a strong preference for either constructivist or traditional teaching approaches but tended to select features from either approach according to how they fit with his vision of exemplary teaching. He believes that children should contribute to decisions about activities and assessment, is comfortable with multiple simultaneous activities in classrooms and considers content to be secondary to sense making. At the same time he prefers an orderly and quiet classroom in which child apply basic skills to solve problems with clear answers. He believes that learning is more "valid" when the child is more active in the learning process.

According to Charles, teachers need a vision for what they wish to achieve but must be prepared to work within the constraints of the context, attending to the individual differences among children. In his own experience, contextual factors, such as the background and behavior of children, have restricted his ability to achieve his ideal of exemplary teaching. In his present school, he considers the socio-economic status of the families to be an obstacle to exemplary teaching because of the limited background experiences available to many children. He believes that it is important for teaches to understand the individual characteristics and needs of children in order to plan and implement appropriately for their classes.

For Charles, "basic areas" provide the foundations necessary for higher-level skills such as problem solving. Computers can be useful for enhancing basic skills, which should be taught early, "consistently and properly". School documents record strategies to manage the transition to an integrated outcomes based curriculum

Charles believes that most children have sufficient exposure to computers outside of school that they regard them as a normal part of the environment. Although he aggress that ICT has applications in all subjects and may make learning more interesting, he tends to disagree with the proposition that children should have regular,

planned access to ICT as a means of instruction. He is concerned to see that ICT is used purposefully and warns that teachers must be prepared for extra work associated with planning for its use and for occasional logistical problems. He is concerned that, if some students work on computers while others are working on different tasks, the noise and movement may disrupt the class but he does envisage the use of computers in learning centers.

A decline in school enrolment has freed up building space, which Charles thinks may be used for a computer laboratory. Recent experience with a six-computer mini-laboratory in the library has convinced him that most of the teachers would now opt for labs rather than classroom placement of computers. The school has had different types of computers in the past and is working towards a standard platform. Other school plans for ICT include purchase of additional equipment and expansion of the school network and Internet access. Plans are also in place for professional development and improved technical support. Although the school mission speaks of children learning to cope with rapidly changing technologies, Charles is ambivalent about ICT as an object of instruction, preferring to focus on developing children's academic and social skills.

Although Charles believes that children should contribute to the planning of activities and accept some responsibility for their learning, he expects his teachers to maintain authority over learning and to accept the responsibility for integrating ICT into class work. He recognizes that teachers are at different stages in their development with ICT and sees his role as providing support and encouragement.

In discussing his beliefs about teaching and ICT, Charles made references to past advisory teachers who had influenced his thinking about approaches to teaching and to the use of ICT. He also mentioned the past influence of senior system officers but did not refer to any recent experiences of networking with colleagues. He has attended various professional development activities related to ICT and has applied what was learned to development of a unit of work. He has identified areas of personal need for future professional development and is considering purchase of a computer for home use. His office computer is slow and used only for basic tasks.

Despite having spent most of his career as a principal, Charles still thinks of himself as a teacher. He replaces absent teachers for about 10 days each year and also works directly with teachers "requesting or requiring support". In those roles he has made an effort to use ICT in the classroom but the range of activities has been quite limited. He has some concerns that an emphasis on technology may diminish the quality of human relationships and sees it as important to promote good relationships. He is confident in speaking about his beliefs but is not confident about the level of integration of ICT in the school or how others would perceive his own knowledge of ICT.

Overall Charles enjoys working with children. He is a reflective person, interested in what others have to say and willing to share his considered opinions. He values the social relationships aspect of the school and admits to limited interests and skills in ICT beyond basic management functions.

Case 3 - Thomas

Thomas has been a teacher for 28 years. He is currently principal of an inner city school with falling enrolments because of shifting demographic patterns. The school has 9 teachers to serve 120 children from predominantly low socio-economic families with about 40% indigenous enrolment. Because of the small size of the school Thomas teaches four days each week.

Thomas believes that constructivist approaches are more useful for children than traditional approaches to teaching but is personally more comfortable with the traditional approach. He prefers a quiet classroom which children working on teacher assigned activities that cover material in a structured way. Nevertheless he encourages those teachers who appear capable to adopt constructivist approaches and is more comfortable with such approaches in his own class when ICT is being used.

He insists that basic skills and knowledge are taught properly and in the context of tasks and future uses. He has found that ICT is motivating for children and has noticed that children from disadvantaged backgrounds require more assistance with basic ICT functions. In his view ICT is worthwhile or even indispensable for instructional purposes. It should be used in all subject areas, regularly but not exclusively because children need variety of

experience. In his school, years 1 to 3 have computers in the classrooms but years 4 to 7 access a computer laboratory. The small number of classes in the school means that access is seldom an issue. Access to the laboratory outside of class time is important for children who do not have computers at home.

As principal, Thomas sees that he has a responsibility to provide children with adequate access to ICT. In addition to buying some new computers the school has refurbished older computers including some ex-government equipment that was bought cheaply. Appropriate professional development has been provided for teachers. Parents have expressed high levels of satisfaction with the approach taken by the school.

Much of what Thomas knows about ICT has been learned through experienced gained by using ICT to perform administrative tasks and prepare university assignments. He has developed an interest in ICT in education and taken several related courses. After having been a non-teaching principal for several years he returned to active teaching in his current position and found that he naturally fell into a didactic approach using direct instruction. He finds that the greatest barrier to change, including more extensive use of ICT, is finding time for adequate planning. For that reason his classroom use of ICT tends to focus on familiar tools such as word processing, PowerPoint and the Internet rather than on educational software with which he is less familiar. Thomas enjoys working with ICT but his use is centered on work applications and he considers that his skills are limited compared to those of his own children.

Overall Thomas is, as a result of his interest and study in the area, probably more aware of ICT than many of his peers. His recent experience of teaching classes has heightened his appreciation of the challenges faced by teachers attempting to integrate ICT. That has increased his confidence for working with teachers to effect pedagogical change.

Discussion

The beliefs articulated by the principals about ICT were compared to published typologies of teacher technology use (Moersch 1996; Sandholtz & Ringstaff 1996). All three principals expressed beliefs indicating that their perceptions of high levels of integration were toward the lower end of the range of possibilities identified in the literature. They mainly viewed ICT as a means of enhancing learning within the current range of pedagogical approaches rather than facilitating new approaches to pedagogy. This restricted vision for the use of ICT is consistent with their limited personal exposure to using ICT in teaching. Although the principals agreed that ICT was a powerful tool for many tasks they saw limits to the need for those tasks to be performed in the classroom especially when account was taken of the additional time requirements for using ICT in an already crowded curriculum and the classroom management issues that come with the use of ICT.

Principals' preferred approaches to teaching were influenced by predominantly traditional views of the nature of knowledge and the perceived need to ensure that all children acquire essential knowledge and skills. All three were engaged in managing a mandated change from subject-based to integrated curriculum and saw the potential for increased integration of ICT in that context.

Investigation of the factors that had influenced these principals' beliefs about teaching with ICT identified the perceived needs of children and personal experience as the major influences. They conceived of education as preparing children for life and saw a need to balance traditional and emerging needs and opportunities.

For this group of principals, beliefs formed and reinforced by years of successful experience are the basis of current responses to the challenges posed by teaching with ICT. Such belief systems are likely to be stable unless they are challenged by alternatives (Pajares 1992). A model based on consideration of self-efficacy theory (Bandura 1997) has been developed as a guide to those working to assist school leaders in developing new and more effective responses to the challenges of teaching with ICT.

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Barriers to Principals Developing New Beliefs about Teaching with ICTs

1. Dilemma of old and new worlds co-existing and need to balance print based and ICT based pedagogy;
2. Focus on building ICT infrastructure and attending to management issues rather than pedagogy;
3. Demands of school management issues;
4. Introduction to ICTs late in life and personal interest in ICTs limited to tasks at work;
5. Limitations in vision of teaching with ICTs, knowledge of educational software, and pedagogical knowledge;
6. Paucity of exemplars of teaching with ICTs;
7. View of knowledge as static and limited understanding about the management of knowledge with ICTs; and
8. Beliefs about teaching e.g., children choices, focus on teaching basic knowledge.

Existing Sources of Information that Influence Beliefs about Teaching with ICTs

Enacting

1. Past experience as a teacher; and
2. Fragmented teaching experiences while releasing teachers for non-contact time, taking classes for absent teachers, and meeting teacher requests for assistance.

Observing

1. Sporadic observations of effective and ineffective teachers in own school based on personal understanding and beliefs about the principles of effective teaching.

Being Persuaded

1. Education Qld mandates and policy;
2. Few opportunities and limited interest in Professional Development;
3. School Opinion Survey; and
4. Professional conversation with teachers and discussions with parents and community.

Affective State

1. Perceived needs of children, including own children; and
2. 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

1. At own school, co-operatively plan and teach a unit of work that makes use of ICTs;
2. Participate in an electronic learning project at an Education Qld Centre of Excellence;
3. Trial educational software to become familiar with objectives and content; and
4. Seek and engage in professional development opportunities e.g., the Caring Intellectual Leadership Model (Rettig et al., 2000).

Observing

1. Observe teaching with ICTs in own and other schools;
2. Visit work places and tertiary institutions to observe use of ICTs and discuss expectations of school graduates;
3. Visit high schools to observe use of ICTs and discuss expectations of children leaving year 7;
4. Visit model schools e.g., Teacher Development Centre, Woodcrest College; and
5. Actively seek exemplars e.g., videos of practices, journal articles, The Learning Place and other web sites.

Being Persuaded

1. Read and reflect on the requirements, purpose and implications of Education Qld mandated policy;
2. Collaborate and network with peers to share stories;
3. Engage in processes to promote congruency between beliefs, principles, and practices (Atkin, 1996);
4. Engage in processes to challenge beliefs (Carlson, 1994);
5. Seek opportunities to identify and reflect on one's beliefs; and
6. Compare exemplars e.g., videos, continua of effective teaching with ICTS, with own beliefs and practices.

Affective State

1. Become comfortable in using ICTs by seeking support from competent staff, private providers and courses, own children, experimentation and play, and troubleshooting;
2. Share stories of successes and challenges with other principals;
3. Take small steps in order to make the larger gains;
4. Aim to go beyond concerns about management issues and resources to create new uses for existing ICTs; and
5. Seek to verify personal beliefs about what is in the interests of children.

New Sources of Information that Influence Beliefs about Teaching with ICTs

1. Environment for change supported by State and National Government policy;
2. 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; and
3. 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

EXISTING PROCESSES ⇓ ⇑ **NEW PROCESSES**

Source: (Otto 2003)

Figure 1: Sources of New Information to Confront Principals' Beliefs about Teaching with ICTs