In Their Own Words: Pre-service Teachers' Perceptions of ICT Integration

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Abstract: Pre-service teachers participated in an online discussion that included a guest who facilitated conversation about integration of ICTs. Students mostly agreed that integration of ICTs was desirable but differed in their views about specific practices. They demonstrated awareness of the challenges facing teachers and schools in integrating ICTs but appeared to have had little personal experience of ICT integration during field experience.

Prologue

One of us is old enough to have taught in the 1970s, when the other was a child in primary school and the place of information and communication technologies (ICTs) in education was very different from today. The terminology of ICTs had not been invented; hand-held four-function calculators were new technology; and a few pioneers were beginning to use computers in schools. Where computers figured in the curriculum, they were objects of study in "computer awareness" or "computer literacy". Most often these topics were the province of teachers of mathematics or science and they frequently involved consideration of binary notation, boolean algebra, half- and full-adder circuits and programming in BASIC. In the late 1980s, there was an expansion of ICTs from mathematics into business education with a focus on teaching skills for generic software such as word processors and spreadsheets in an office environment. The focus throughout those decades was on teaching *about* computers.

Now, over 25 years later, personal computers have been available long enough that one of us has an adult daughter who cannot remember home without computers. Personal computers are common and easy enough to use that his grandchildren regard email as a basic form of communication with extended family and one grandson had digested his knowledge of dinosaurs, gained largely from independent use of CD-ROMs, into a personal web site before beginning school. The other of us has owned a computer since the beginning of her teaching career and her son, considers the use of an eyeball camera and computer as a normal method of communicating with his godfather who lives 1500 kilometers away. Our grandchildren and children consider technology as part of their every day life. For them, ICTs are thoroughly integrated. Our task is to prepare teachers to integrated ICTs in their teaching.

Context

Recent Australian reports have referred to the "information economy", the "knowledge society" (DETYA, 2000) or "knowledge nation" (Jones, 2001). Regardless of terminology, it is clear that the impact of ICTs requires changed approaches to education. It is no longer sufficient, or even, perhaps, necessary to teach *about* computers as in the 1970s. It is necessary to teach *with* and *through* ICTs to prepare students for life in a rapidly changing world.

Queensland policy on computers in education began in 1983 (Galligan, Buchanan, & Muller, 1999). Its focus was on computer awareness, basic skills, computer assisted learning and vocational programs. In 1991 the effect of rapid technological change on learning and teaching was identified as one of eleven key issues for Queensland education and the integration of information technology for learning and teaching was listed as one of four goals for schooling (Queensland Department of Education, 1991). In 1994 a revised policy document, emphasized the use of computers to support learning across the curriculum at all year levels, while still acknowledging the importance of computer skills for future employment (Queensland Department of Education, 1994). *Schooling 2001* (Education Queensland, 1998b) set system-wide targets to be achieved by 2001. These included the provision of one computer for every 7.5 students, the connection of every classroom to the Internet, and the use of computers "in all key learning areas, P-

12". Minimum standards for teachers in the use of learning technology were set (Education Queensland, 1998a). More recently the *New Basics* project has shifted the focus to the application of ICTs within *rich tasks,* which span multiple curriculum areas. Examples include the construction of multimedia profiles and web pages by children in their third year of schooling (Education Queensland, 2000).

Australian education has two goals for ICTs in education (Toomey, 2001). They are that students leave school as "confident, creative and productive users of new technologies" and that schools integrate ICTs to "improve teaching and learning". These same themes have emerged through the development of Queensland policy. As ICTs become more deeply embedded in society, the focus on teaching ICT skills as distinct from the use of ICTs for teaching and learning blurs and the two goals merge. Although teacher education programs will need to adapt to these changes, there is, as yet, no mandatory requirement for teacher preparation programs in Queensland to ensure that graduates meet the minimum standards in learning technology nor even to address the issues of technology integration. However, most programs have responded. A previous paper described some approaches being adopted at the University of Southern Queensland (Albion, 2000) including modeling of ICT integration within classes and the design of a course (85045) focused on preparing graduates to meet the minimum standards and to integrate ICTs. This study was situated within that course which is described in more detail elsewhere (Redmond, 2002).

Method

Both authors and a colleague taught in the 85045 course in first semester of 2001. In the belief that computer mediated communication (CMC) was an important tool for teachers and that there was value in learning through practical experience, students were required to complete minor group projects using CMC in the form of mailing lists and newsgroups. The activities provided a context for CMC experience but, given that the tasks could have been completed in face to face meetings, were somewhat contrived. In reviewing the course, a less contrived CMC activity was sought. Previous studies have demonstrated the value of an "online guest" in providing a "focus for dialogue" and directing conversation (Williams & Bowes, 2000). It was thought that an online guest would provide purposeful focus for the CMC activities in the 85045 course and be less contrived than the original activity.

In second semester of 2001 one of us (Albion) was working in the USA. This provided an opportunity to engage students from the 85045 course in a CMC activity involving a member of the course team as an online guest. The proposed activity would allow the absent team member to maintain contact with the course and enable students to experience, by modeling, a teaching approach which might be applied in their own future classes. Experience with students in previous offers of the 85045 course had suggested that many found difficulty in grasping important concepts associated with integration of ICTs into teaching and learning. Hence integration of ICTs into teaching and learning was selected as the topic of discussion with the online guest. As it happened the "guest" was concurrently teaching two sections of a course discussing technology integration with teacher education students in the USA.

To allow time for introductory work, the activity was scheduled for a block of six weeks in the middle of the course which, allowing for a two week recess, corresponded to four weeks of scheduled classes. The activity was announced early in the semester when the classes were introduced to the use of CMC. Because students in this group had some prior experience of electronic mail including listservs and personal mailing lists, a newsgroup was selected as the CMC venue for this activity in order to provide students with experience of threaded discussion. The newsgroup was created two weeks prior to the date set for introduction of the guest who was to join the group on Monday, September 7. The first author posted a message introducing the guest four days prior to the scheduled start of the activity. By that time one student had already posted an anticipatory message and three others did so before the guest made his first posting.

Results

Figure 1 shows the distribution of postings over time. The recess is visible as a period of reduced activity. Most postings occurred on days when classes met in computer laboratories and tutors were able to prompt activity.
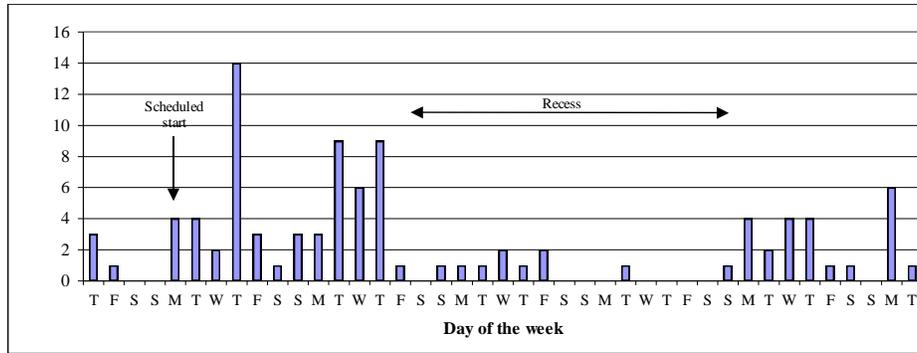
Figure 1: Distribution of postings over time

Table 1 provides the distribution of frequency of posting by individual students. Most students posted just once and relatively few posted more than twice. Several of those who posted twice appeared to have done so in error, possibly because the repeated the process when their first attempt was not immediately visible in the list of messages. Assessment credit was available for posting, so many of those who posted once did so for that reason although their posts were typically no less relevant than those of the more frequent correspondents.

Number of postings	0	1	2	3	4	5
Frequency (N = 80)	24	41	10	3	1	1

Table 1: Distribution of postings among students

In his introductory posting the guest commented on the value of having a sense of direction in daily life and invited students to comment on the need for teachers in a school to have a common understanding or sense of direction in regard to ICT integration. Students were also invited to explain why they thought a common view was or was not necessary. The first responses tended to agree that some common view was necessary although it was not long before ambivalent and contrary opinions surfaced. The earliest responses suggested that the common view:

> *"should be couched in plain language, simple, … that can accommodate people from disparate backgrounds"*
> *"serves as a direction for how the school functions with technology, (having different understandings) may result in conflict among teachers".*

Most students agreed with the proposition that a common view was desirable. Their reasons for thinking so varied:

> *"(communication among teachers is possible) only … if all parties are coming from the 'common view'"*
> *"(a mutual decision is needed) about the importance of children learning, understanding and interacting with technology in the classroom."*
> *"If teachers don't know what they are talking about, or have a different understanding of what technology integration is, then the students we are teaching will be even more confused than they already are."*
> *"so that students don't miss out regardless of a teachers perception of information technology"*
> *"in order to benefit children's learning and also to share a common school goal and understanding"*

Some thought that an effort to develop a coherent shared view of technology integration might be doomed to failure:

> *"How can you possibly get a bunch of diverse adults with different ideas on what technology should be used, then get them to agree on what technology integration means? I foresee a turbulent time. ☺"*
> *"Since there are so many divergent views on what education is, and how it should be approached, I doubt that teachers will ever agree on what technology integration is and how it should be approached"*
> *'I think it would be very difficult for all teachers to agree on technology integration within classrooms. For one, the broad range of abilities of teachers gives a large range in classrooms with regards to the amount of technology being integrated."*

There were others who expressed ambivalence or, perhaps, an appreciation of the complexity of the issue:

> *"… do they need to have a common view? Well… yes and no. Yes they do need to have a basic understanding or platform, but every teacher will interpret technology integration as appropriate for their curriculum area*

and age group. It will be different and so it should be. Teachers are individuals with varying abilities, experiences and personalities. Their approach to technology integration will reflect this. If teachers integrated technology in the same way for all subjects, what a boring place!"

"Common views improve communication and make the use of time more efficient. They can however exclude new ideas or perceptions which could make education an easier more productive experience"

"The common understanding is important as this will provide continuity throughout the grades and between classes. However some diverse views may stimulate some discussion, critical reflection and evaluation that makes the curriculum integration plan better. Thus I think it is important to have a common understanding but one that is open to discussion and change"

Although few threads developed beyond two levels – message and response – it was evident from the references to other postings, mostly agreement, that students were actively reading the postings. At the end of the first week it was one of the mature age students who anticipated the guest's intention by writing

"Most agree that Yes most teachers should have a common understanding of Technology Integration. But most also agree that the task may be quite impossible with the current abilities of teachers ... (for this discussion) we should at least have a common understanding of the meaning ... I would like everyone to give their definition.'

Acknowledging this response, at the beginning of the second week the guest briefly summarized the postings to that point, expressed an interest in having students define "technology integration" and drew some parallels between ICTs and literacy education. He then invited responses to two new questions. The first was to provide a definition and the second to make a comparison between the position of ICTs in education and that of basic literacy or reading and writing. Some students appeared to agree that there were parallels and developed the idea further:

" 'integrating technology' into the classroom is about being able to use technology as a tool in the classroom to enhance learning, just like any other tools such as books ... Books opened up the world to people from the time of the first printing press ... just as technology of another sort, computers, can open up the world for people. As always though, equity is a problem"

"If you regard IT as a Literacy, just as English is, then it obviously needs to be deeply integrated into school activities, as well as being explicitly taught. But don't mathematicians and scientists (for example) also believe that mathematical and scientific thinking should permeate all areas? Don't you think it could get a bit top heavy if all learning areas are regarded as a dominant discourse?"

"When I think about the concept, I see it as a teaching tool - a way of teaching the skills and knowledges within the (curriculum). It seems to be closer to ... principles of teaching and learning, than a specific subject area ... The problem is that IT as a 'subject area' within schools is not the same as 'IT integration' across the curriculum - a bit like the difference between teaching literacy as a specific subject, and using literacy techniques within teaching of other subjects ... while individual teachers may hold a common understanding of exactly what that is, the way they use it within the classroom is going to be different"

As early as the second day of discussion there had been comments about resources and teacher preparation for ICT integration. One student had commented that some teachers are "*dead scared of computers*" and "*ignorant of the ways they can be used*". He called for additional funding for resources and trained support personnel in schools and others offered similar comments. Continuing this line of practical comments, students wrote:

"... there are millions in this country (who are not computer literate) and many hundreds of millions who are struggling to become literate in any sense ... ICTs would have to be all pervasive for the need of another 'literacy', that is when all of us have access to these technologies all of the time ... in a typical high school classroom there isn't any access to these technologies!!!!!"

As might be expected in a conversation of more than 50 voices, albeit each only briefly, many ideas were expressed in no particular sequence. Some students waited until the end of the activity to express their thoughts, which were as likely to be linked to the first postings as the later ones. Despite that there did appear to be some development in ideas as the conversation progressed although there were dissenting opinions even in the closing stages:

"I think there is too much emphasis on technology. Children cannot spell any more ... Even though I don't mind computers, children should not be exposed to them at such a young age. ... Why can't we teach younger to type on typewriters and then at a later stage - high school- put them on computers. I also had given an assignment ... one of the tasks was to write the assignment out by hand. A lot of children were complaining. What does this say about our emphasis on technology?"

"I too think there is to much emphasis on technology especially in primary schools. Within a high school computers become more important in the publication of assignments and important for future employment or university studies."

During the second week of discussion, the guest had recounted an example of a teacher integrating ICTs and invited students to contribute their own examples. Few chose to do so, which was, perhaps, a reflection of the paucity of examples they had seen during field experiences. There were some comments in response to the invitation:

"I am quite concerned to say that I cannot think of a specific example!! This worries me a little. All I can say is that we are the new fresh faces going out to teach and we need to integrate technology into our lessons and provide variety."

"I think it is quite unfortunate that we have so few positive experiences to contribute to the group of how to integrate technology into the classroom. ... I saw some examples where IT was used satisfactorily, such as researching assignments and preparing either the essay or the presentation, and some examples where the teacher stopped teaching and just expected the IT to do the job for her without effective monitoring."

"From what I have seen out there the students know more than a lot of the teachers and have better facilities at home."

Conclusions

Possibly without exception these pre-service teachers saw ICTs and their integration as important issues in their future careers as teachers. However, some seemed to experience some difficulty in articulating a view of what ICT integration might mean in practice and others appeared skeptical about what they saw as an emphasis on ICTs rather than the more traditional values of education. Both of these findings are perhaps related to the relative paucity of good examples of integration encountered during field experience. It is inevitably difficult for them to imagine how they might engage in behaviors for which they have few models. There is a clear need to continue developing university programs which model ICT integration and to develop stronger partnerships with schools where appropriate models are in practice.

There seemed to be a substantial level of awareness of the challenges faced by schools and teachers seeking to integrate ICTs. Among those referred to in the discussion were curriculum pressure, lack of ICT resources, inadequate technical support and a continuing need for teachers to receive appropriate professional development. As a group they appear to harbor few illusions about the challenges they will face after graduation.

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