

# Intentions v Reality: Pre-service teachers' ICT Integration during Professional Experience

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**Abstract:** This study extends previous work on pre-service teachers' use of Information and Communication Technology (ICT) during professional experience by collecting data about intentions for ICT use prior to an experience and comparing that with use reported after the placement. The paper describes activities pre-service teachers planned for their students, identifies factors which supported and inhibited ICT use and describes strategies used to address barriers. The analysis should provide insights as to how best to prepare pre-service teachers prior to professional experience for effective ICT integration.

Despite the presence of computers in educational institutions for over 30 years, the effectiveness of ICT as a teaching and learning tool still varies considerably. A study by Becker (2000) of 4000 teachers in 1100 USA schools concluded that computers have not transformed the teaching practices of a majority of teachers although there is evidence that, when teachers favor constructivist approaches and have some curriculum freedom together with access to equipment and training, computers can be valuable instructional tools. Faculties of Education have an important role in assisting in-service teachers to adapt and take advantage of ICTs to transform teaching and learning, but the primary role of a Faculty of Education is to ensure that teachers enter the profession "adequately prepared to use new technology" (NCATE, 1997) in the dynamic classrooms of the 21<sup>st</sup> century.

For a variety of reasons there are some apparent mismatches between the use of ICTs in teacher preparation programs and the better examples of use within P – 12 classrooms. Many teacher education programs have achieved only minimal modelling of teaching with ICTs and impose only minimal requirements on pre-service teachers to engage in ICT integration as part of their professional experiences. Too few teacher educators regularly provide their students with examples or models of how ICTs are used effectively within current schools. Moursund & Bielefeldt (1999) reported that "teacher-training programs do not provide future teachers with the kinds of experience necessary to prepare them to use technology effectively in their classrooms" (p i). They also commented that "most student teachers do not routinely use technology during field experience and do not work under master teachers and supervisors who can advise them on IT use" (p 2). Since that time the PT3 program has supported significant change in the USA but many teacher education programs elsewhere, including in Australia, are still struggling to provide the necessary levels of preparation.

Faculties of Education across the globe acknowledge that a crucial element of contemporary preservice teacher education is the preparation of technology-proficient teachers (Kariuki and Duran, 2004). This requires a conceptual plan to move both academic staff and pre-service teachers beyond the ability "to adapt to emerging technologies as a matter of survival" (Blake, Holcombe & Foster; 1998, p.40). Graduates should have the competence and confidence to use and model ICT tools for the purposes of administration, planning, teaching and learning. The relationships between teachers' attitudes towards ICT integration; access to ICT resources and training; personal knowledge,

skills and experience; confidence and motivation to use ICTs are widely acknowledged as impacting on the success of ICT integration (Muffoletto & Knupfer, 1995; Redmond & Brown, 2004). This study explored additional factors that impact on efforts to integrate ICTs during pre-service teachers' professional experiences.

Although there appears to be no single factor that determines whether and how teachers use ICTs in their teaching, there is widespread agreement that teacher preparation plays a significant role. Technical skills in the use of ICTs continue to be important but, as the skill levels of students entering teacher preparation programs continue to rise, pedagogical considerations related to ICTs are increasingly viewed as more important. The tendency of teachers to "teach as they were taught" means that access to appropriate models of teaching with ICTs is important in teacher education programs (Parker, 1997; Zachariades & Roberts, 1995). It was against this background that the 2003 reaccreditation of the Bachelor of Education (BEd) program at the University of Southern Queensland (USQ) opted for integration as the sole means of preparing most students to teach with ICTs.

As with most teacher education programs the treatment of ICTs has been handled using a variety of methods over time, from specific skill-based courses, through the addition of pedagogically-oriented courses and now full integration through the program. Previous studies have investigated aspects of the treatment of ICTs in the BEd program at USQ. Data from a recent study (Albion, 2003) indicated that, compared to previous students, those graduating in 2002 were more confident about using ICTs and more likely to use them in their classes during professional experience. It seems equally clear from the previous studies that the likelihood of students using ICTs during their major teaching experience has increased over the years. However, interviews with students suggest that the conditions they encounter during professional experience are variable and likely to affect their use of ICTs.

This study investigated final year USQ BEd students' intentions to use ICT during their major professional experience and the factors that might affect those intentions. The study focused on the following research questions:

1. What are the intentions of final year BEd students for ICT use during their major professional experience?
2. What use do final year BEd students make of ICT during their major professional experience?
3. What factors influence the capacity of final year BEd students to carry out their intentions for ICT use during their major professional experience?

The results from this study should provide both a basis for understanding how the BEd program is preparing graduates to work with ICTs and a baseline for future investigation of the impact of changes being implemented in the treatment of ICT in the BEd program. This paper presents preliminary findings about factors that support and inhibit preservice teachers' integration of ICT during professional experience.

## **Method**

Students who participated in this study were in the final year of the 4 year BEd. Their major professional experience involved a 5-week block during which they assumed major responsibility for planning and teaching. The study collected data about students' intentions for ICT use prior to their professional experience (first questionnaire) and about their actual experience with ICT in teaching after their return from professional experience (second questionnaire). This allowed comparison between intentions and actions, and investigation of factors that influenced students' capacity to give effect to their intentions.

Data were collected using questionnaires, which included closed questions, using Likert scales and similar devices, and open questions, supported by semi-structured interviews. Variables under consideration were attitudes about using computers in classrooms, intended and actual use of ICT tasks and activities during the professional experience, linking of prior knowledge and experiences with success of ICT integration and anticipated barriers to successful integration while on professional experience. The questionnaires were first administered in lecture classes for core courses studied by the relevant cohort of students but, because attendance at those classes was limited, students were subsequently sent email messages inviting them to respond to online versions of the questionnaires. Data from print and online versions of the questionnaires were pooled and analyzed using quantitative and qualitative methods as appropriate.

## Results

Of the 140 students in the relevant cohort, 39 and 47 responded to the first and second questionnaires, respectively. Table 1 shows the distribution of respondents to each questionnaire by gender and age.

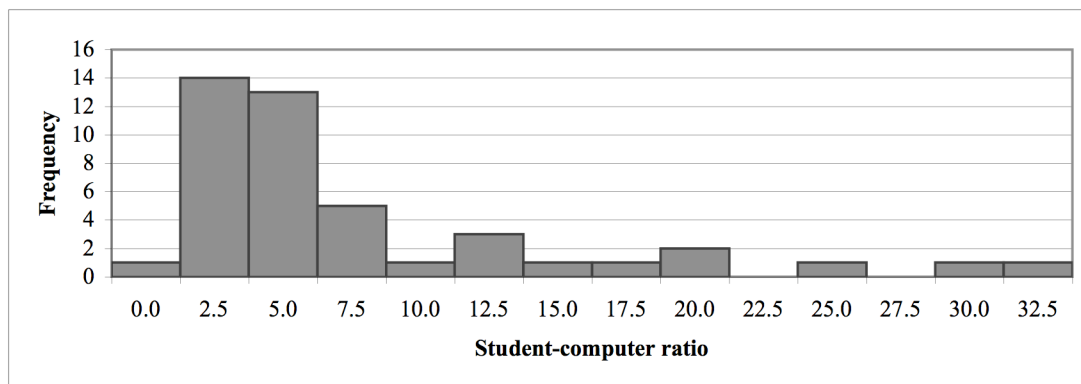
Age	First questionnaire						Second questionnaire					
	Males		Females		Total		Males		Females		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Less than 22 y	2	20	6	21	8	21	6	40	16	50	22	47
22 – 25 y	2	20	10	35	12	31	2	13	6	19	8	17
26 – 29 y	1	10	3	10	4	10	1	7	2	6	3	6
More than 29 y	5	50	10	35	15	39	6	40	8	25	14	30
Total	10	100	29	100	39	100	15	100	32	100	47	100

**Table 1: Respondents by gender and age**

The first questionnaire included an item in which respondents indicated how nervous they were, on a four point scale, about using computers in the classroom. 54% reported being “not nervous”, 36% were “a little nervous”, 10% were “nervous” and none reported being “very nervous”. Respondents indicating a degree of nervousness reported the following reasons: lack of confidence, lack of knowledge and skills, ineffective use of ICTs, access to ICT resources and quality of equipment, lack of experience, technical issues, and lack of knowledge regarding the children’s level of ICT skills. On the same questionnaire 72% of respondents indicated that they thought it was “very important” for teachers to know about computers and the remaining 28% thought it was “important”. These results are similar to those obtained for an equivalent group of students in 2002 (Albion, 2003).

The second questionnaire sought data about the conditions under which students had engaged in their professional experience, which most students undertake in smaller, and sometimes isolated, schools. Just 30% reported teaching a class with just a single year level. The remaining students were assigned to classes with 2 (25%), 3 (21%), 4 (15%) or more (10%) year levels. These assignments added to the complexity of the planning and management needed for successful teaching.

The second questionnaire also asked about access to computers within and outside the classroom. Using data reported for the numbers of pupils in classes and the numbers of computers in the classroom, the student-computer ratio was calculated for each class. The mean value was 7.8 and the standard deviation 7.5. Figure 1 represents the student-computer ratio in a histogram. In relation to computer access outside the classroom for use by the class, 38% reported they had none, 30% had access to a laboratory, 4% shared with another class and 11% had access in the school library. For personal use in preparation and other work, only 11% reported having their own computer and 6% had access to a staff computer. The remaining students were restricted to accessing computers available to the class when they were not in use for teaching.



**Figure 1: Distribution of student-computer ratio in classes**

On both questionnaires respondents were asked to indicate the frequency of ICT use by themselves and students in their class for various types of tasks. The tasks were identified, with examples, as follows:

<b>Research</b>	Finding information, activities on CD or Internet
<b>Publishing</b>	Writing lesson plans, student activity sheets, PowerPoint, using digital camera images, creating web pages
<b>Data analysis</b>	Graphing in a spreadsheet, calculations, using a database
<b>Communication</b>	Email, chat or discussion lists.

On the first questionnaire the question referred to intentions for use. On the second questionnaire it was revised to refer to actual use. Tables 2 and 3 display the relevant data, as percentages of respondents, for frequency of use by student teachers and the children in their classes, respectively.

	First questionnaire (N = 39)					Second questionnaire (N = 47)				
	Not at all	Less than weekly	Weekly	Daily	More than daily	Not at all	Less than weekly	Weekly	Daily	More than daily
Research	-	8	33	49	10	9	2	37	41	11
Publishing	-	3	20	54	23	6	2	15	50	27
Data analysis	8	48	36	5	3	54	23	15	8	-
Communication	-	10	31	36	23	21	27	27	15	10

**Table 2: Relative frequency of ICT use by pre-service teachers for indicated tasks**

	First questionnaire (N = 39)					Second questionnaire (N = 47)				
	Not at all	Less than weekly	Weekly	Daily	More than daily	Not at all	Less than weekly	Weekly	Daily	More than daily
Research	-	5	64	26	5	16	18	35	31	-
Publishing	-	16	52	29	3	15	15	38	26	6
Data analysis	10	40	45	5	-	66	19	13	2	-
Communication	6	29	43	22	-	74	11	9	6	-

**Table 3: Relative frequency of ICT use by students for indicated tasks**

Both questionnaires also invited respondents to mark as many of a set of 16 learning activities in which ICTs might be used if they intended to (first questionnaire) or actually did (second questionnaire) engage their classes in those activities.

Student learning activities	First questionnaire	Second questionnaire
Open activities	71	66
Closed activities	50	51
Teacher led activities	71	55
Peer tutoring	53	45
Drill and practice	18	21
Learning ICT skills (WP, Internet, etc.)	76	64
Games	45	68
Unstructured Internet surfing	21	13
Keyboarding	45	47
Programming	5	2
Higher order thinking	58	28
Communicate electronically	45	15
Working cooperatively	71	47
Locating information	87	62
Presenting information	82	66
Working independently	76	83

**Table 4: Proportion (%) of respondents reporting intended or actual use of learning activities**

Each of the questionnaires invited a series of open-ended responses to questions about managing equitable access to ICT resources, matching ICT-based activities to off-computer activities, and factors that might facilitate or impede the use of ICT during professional experience.

On the first questionnaire responses about managing ICT resources included timetables and rosters, 'round robins' and other forms of rotation of students through activities such as work stations and accessing a computer laboratory. The same responses appeared on the second questionnaire with some additional strategies including access for students out of class time, monitoring individual use through devices such as checklists, use of computers in other classrooms, and access to a specialist ICT teacher.

Respondents expressed intentions to match ICT activities to other class work using strategies such as unspecified linkage to other curriculum activities, links to assessment, and using computers for presentations, follow-up activities and extension work for "fast finishers". On the second questionnaire some respondents indicated that they had not matched ICT activities with other work for reasons including limited opportunities for ICT use by students. Strategies reported as actually implemented included research and linking to subject specific activities, having students select a range of tasks including both on and off computer tasks, and follow-up activities.

Factors mentioned in the first questionnaire as expected to enable ICT use during professional experience were almost all related to aspects of the respondents' personal backgrounds. They included personal confidence with ICT arising from experiences at home and at university, personal interest in using ICT and willingness to try something different. Other factors included the capacity of ICT to provide students with presentation choices. Factors mentioned in the second questionnaire were mostly similar with the addition of the willingness of staff and students to get involved with ICTs. Only two respondents explicitly mentioned their mentor teacher as an enabling factor.

Anticipated inhibiting factors reported on the first questionnaire included some related to personal experience and capability (not having seen ICT use modeled in the classroom, lack of experience with ICT as a learner) and a greater number related to the context of the experience (lack of knowledge about learner prior knowledge, lack of knowledge about ICT resource availability and reliability). Inhibiting factors reported on the second questionnaire included some related to personal limitations (lack of ICT knowledge in general and of specific resources in the classroom) and several related to the context (poor Internet access, limited knowledge of school network, lack of technical support, limitations of students' prior knowledge). General comments at the end of the questionnaire mentioned additional inhibiting factors such as the limitations imposed by students' lack of keyboarding skills and the constraints imposed by a mentor teacher who did not see ICT as worthwhile.

Respondents on the second questionnaire offered several suggestions for improvement of their university program as a preparation for ICT use. Many of these mentioned the need for more explicit teaching about ICT in coursework, increased exposure to models for teaching with ICT and making mentor teachers aware of the need for professional experience to include working with ICTs.

## **Conclusion**

The professional experience placement gives pre-service teachers the opportunity to apply skills and knowledge gained through BEd courses to their work with children in a variety of classroom contexts. The roles of the professional experience school and of mentor teachers are critical because if "students are taught the latest technology uses as part of their teacher education programs, but don't see effective technology practices in the schools, they are unlikely to incorporate technology use in their own teaching" (NCATE, 1997).

Within the previous and current teacher education program at USQ there are no minimum expectations regarding the use of ICTs within the classroom while on professional experience and only a small minority of pre-service teachers is expected (by their mentors) to teach using ICTs during their professional experience. It is time for a more carefully coordinated approach, in which the Faculty of Education and the cooperating schools begin to share responsibility for providing opportunities for pre-service teachers to observe and develop skills, knowledge and positive attitudes towards ICT integration within the classroom.

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