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The Preparedness of Pre-service Teachers to use ICT in the Classroom.

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Abstract: With the significant increase in the use of Information and Communication Technologies (ICT) in the classroom (Baskin & Williams, 2006) and the recent explicit mention of ICT proficiency in the National Professional Standards for Teachers (AITSL, 2011), there is a need to incorporate and model ICT use and integration into teaching and learning within pre-service teacher education programs. This paper reports on final year pre-service teachers' perceptions and the major influencing factors on their preparedness to integrate ICT into the classroom. Data was obtained through semi structured interviews and through an online survey that was conducted as part of the National Teaching Teachers for the Future project. The online survey was open to all pre-service teachers and consisted of a series of likert scale responses that were based around the Technological Pedagogical Content Knowledge (TPACK) framework (Koehler & Mishra, 2009). Interviews with six pre-service teachers from a Bachelor of Education (Junior Primary and Primary) were examined and a number of key themes were identified. The survey data and the interviews indicated that the pre-service teachers had varying levels of prior experience which directly affected their integration of ICT into the classroom. Perceived confidence and school-based placements emerged as key influencing factors, with a positive experience in the placement being dependant on the technological pedagogical ability of the mentor teacher. Overall the pre-service teachers expressed that there were aspects of their teacher education courses that could be further developed to support their ICT integration in the classroom.

Keywords: Teacher education, ICT, curriculum, professional experience, pedagogy.

Introduction

Society is becoming more and more dependent on digital technologies as a medium for locating information, sharing ideas, communicating and publishing. In general, today's students have access to a wide range of digital technologies and therefore they also expect to have access to technologies in their classrooms to assist them with their learning. With an increased presence of technologies in the classroom, teachers must have the confidence and competence to be able to effectively integrate technologies into their teaching and student learning. Teachers' competency with technologies has been shown to be a strong determinant of their level of technology integration in the classroom (Chen, 2010). As a consequence practicing teachers should be offered frequent and relevant professional development where pedagogically sound methods are demonstrated for effective integration (Chen, 2010); similarly pre-service teachers (PST) should have opportunity to develop their skills and teaching strategies in their teacher education courses. In addition, the potential for digital technologies to enhance student learning through pedagogical transformation has been acknowledged in the recently developed National Professional Standards for Teachers (AITSL, 2011). These standards have explicitly identified the importance of graduating teachers through to lead teachers, being able to demonstrate their information and communication technologies (ICT) proficiency.

A number of studies (Lock & Redmond, 2010; Neiss, 2008) have identified the importance of teacher education programs assisting pre-service teachers in developing not only their technological skills, but in utilizing a range of teaching strategies to integrate ICT into the curriculum. Redmond, Albion & Maroulis (2005) have however found that there is limited modeling by teacher educators and little opportunity for pre-service teachers to practice ICT integration. The Australian Government has recognized the importance of building the ICT capacity of pre-service teachers and initiated funds for a national project (Teaching Teachers for the Future) to provide teacher education institutions with access to expert pedagogical officers and online modules to support the development of ICT capabilities of pre-service teachers.

The Technological Pedagogical Content Knowledge (TPACK) as developed by Mishra and Koehler (2006) provides a conceptual framework to understand the knowledge required by pre-service teachers for effective ICT integration. This framework was used by the Teaching Teachers for the Future project. To date, teacher education programs have tended to focus on the development of pedagogical knowledge, but this is proving inadequate where the use of ICT is needed to develop 21st century teaching and learning skills. TPACK offers guidance in analyzing how the application of technology relates to content and pedagogical knowledge. It acknowledges the complex, dynamic and multifaceted nature of teaching. The framework (Figure 1) explains the knowledge bases, of content knowledge, pedagogical knowledge and technological knowledge, required for effective implementation of ICT into classroom teaching and learning. Authentic integration occurs when teachers are able negotiate and understand the complexity associated with the intersection of these knowledge bases (Schmidt et al., 2009).

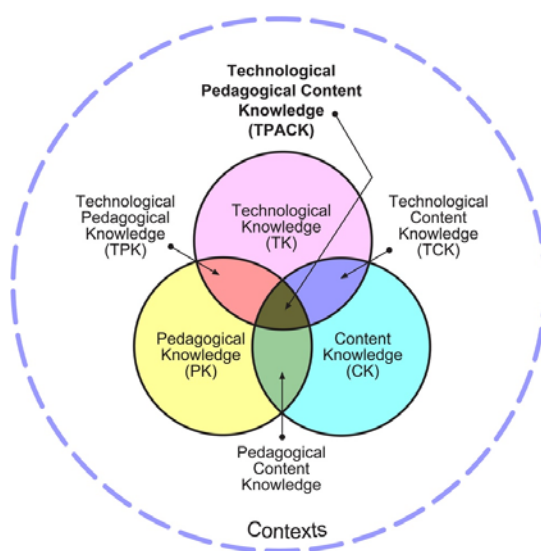


Figure 1: The TPACK framework and its knowledge components (Koehler & Mishra, 2009).

Although the majority of current pre-service teachers have grown up surrounded by technologies, they commence teacher education programs with a diverse range of ICT skills. It cannot be assumed that they all have the required skills and so opportunities must be provided to allow pre-service teachers to acquire them. However, while many pre-service teachers use technologies extensively, they tend to be more focused on social media rather than on the capacity of technologies for learning (Lei, 2009). Teachers have the potential to impact the beliefs and values of students, and therefore their competencies and experiences with ICT are important in adapting their pedagogy to meet the needs of today's learners (Chen, Lim & Tan, 2010). Thus the focus of courses should be not only on skill acquisition, but also on a pedagogical approach that implements ICT. In general, teacher educators recognize the importance of integrating ICT skills, but often this is realised with a single technology course which is inadequate in preparing teachers for the challenges of integration (Hsu & Sharma, 2006). Courses need to be designed so that they build on the skills progressively and support pedagogical development. Although the modeling should ideally occur within curriculum methodology resources, it has been found that teacher educators often lack confidence and competence with their ICT skills (Jones, 2004). Where ICT is used, it may only be used for productivity purposes (Becta, 2007). Also many classes are run by sessional staff who may lack the skills and are not given the necessary professional development. Further to this, not all teaching spaces have adequate access to ICT to enable the modeling to occur.

Pre-service teacher's sense of preparedness are affected by access, skills and attitudes to ICT, knowledge, ICT experiences, time and the workload in their teacher education programs (Dexter &

Riedel, 2003; Teo, Lee & Chai, 2008). Their recognition and understanding of the benefits of technologies to improve student learning further influence their intentions and persistence regarding its integration into teaching (Anderson, Groulx & Maninger, 2011). Given these variables, Anderson and Maninger (2007) suggest that the role of teacher education is to provide well-designed programs that can build a foundation on which pre-service teachers can demonstrate effective integration.

The organisational context in schools can influence the use of technology, but specifically it has been shown that “access to technology, a supportive school culture, and adequate time for pre-service teachers to explore educational use of technology are essential for technology integration” (Chen, 2010, p.34). Professional experiences in schools play a key role in technological growth of pre-service teachers. Thus, if they are placed in a supportive environment, they can feel comfortable to experiment with ICT integration (Chen, 2010). It is also important that they experience effective ICT modeling by their mentor teachers. Using a variety of data collection methods, this study investigates final year primary pre-service teachers’ perceptions and the major influencing factors on their preparedness to integrate ICT into the classroom.

Methodology

This study focused on pre-service teachers who are studying to be primary school teachers and examined what they consider to be the main factors influencing their preparedness to use ICT in their teaching. Two data sources were used: an online survey which was part of the national Teaching Teachers for the Future project, and interviews. As part of the Teaching Teachers for the Future project, pre-service teachers were invited to complete an online survey that sought to identify the Technological Pedagogical Content Knowledge (TPACK) of pre-service teacher education students. The survey was quite extensive, but only the questions relating to pre-service teachers confidence in using ICT to teach and support students’ learning with ICT, and their beliefs about the usefulness of ICT for teaching and students use for learning, were drawn upon for this paper. These questions took the form of a statement (e.g. ‘How confident are you that you have the knowledge, skills and abilities to use ICT to design learning sequences, lesson plans and assessment that incorporate ICT use by students?’), that the students had to respond to on a 7 point (0-6) Likert scale. There were 198 students who completed sufficient questions in the survey to provide useful information.

It was recognized that because pre-service teachers possess varying levels of ICT confidence and competence, that their stories about their preparedness would be unique and that, through interviews, their stories about their proficiency could be voiced. Using an interpretive approach, six pre-service teachers, who were purposively selected, were interviewed to provide further breadth and depth to their sense of preparedness. Some of the key themes emerging from these interviews included their perceived confidence in using ICT, beliefs about ICT, classroom use of ICT and pedagogically sound practice using ICT.

Results and Discussion

The national survey data provided background information for the cohort of students being examined. There were a number of questions that related to the pre-service teachers beliefs about the usefulness of ICT for teaching, their confidence in using ICT for teaching, the usefulness for their future students of using ICT for learning and their confidence in facilitating their students’ use of ICT for learning. The responses to each of those categories were combined to give an overall mean and these are reported in the table below.

Table 1: Selected national survey data

Category	Mean	Standard Deviation
confidence in using ICT for teaching	4.16	.907
usefulness of using ICT for teaching	5.30	.734
confidence that they can facilitate their students use of ICT for learning	3.59	.929
usefulness for their future students using ICT for learning	5.25	.828

It can be seen from the data above that generally the pre-service teachers believed that ICT would be very useful for them in their teaching and that their students would find it useful for learning. The confidence level on average was not as high as their perceived usefulness, and from the graphs below (Figures 2-5), it can be seen that the variation in confidence levels was greater than the perceived usefulness levels. It can also be seen from the graphs that all of the pre-service teachers rated the usefulness of ICT as 3 (moderately useful) or above. Overall the preservice teachers recognized the usefulness of ICT to facilitate learning, but were less confident about their ability to integrate ICT.

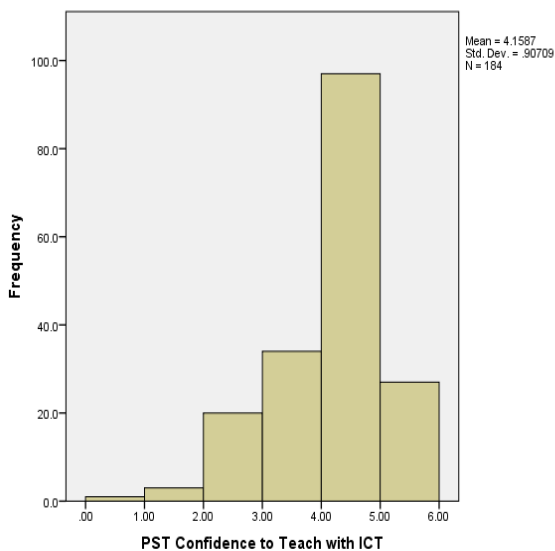


Figure 2 PST confidence to teach with ICT

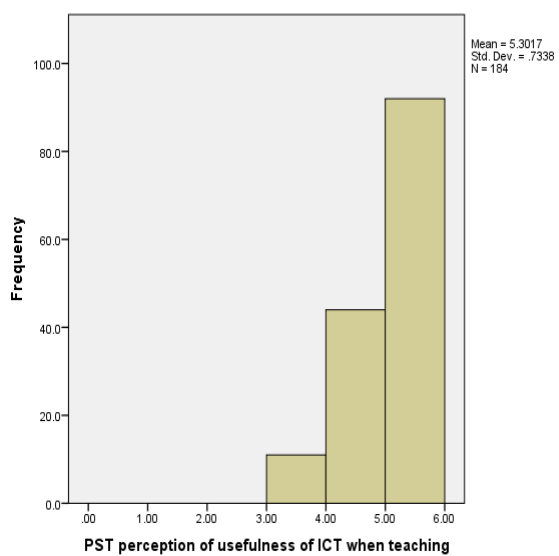
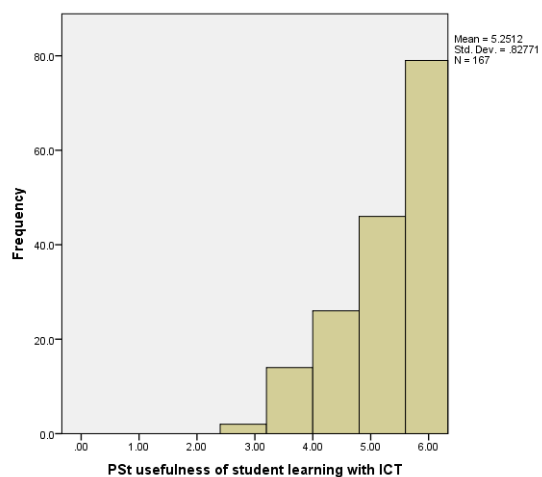
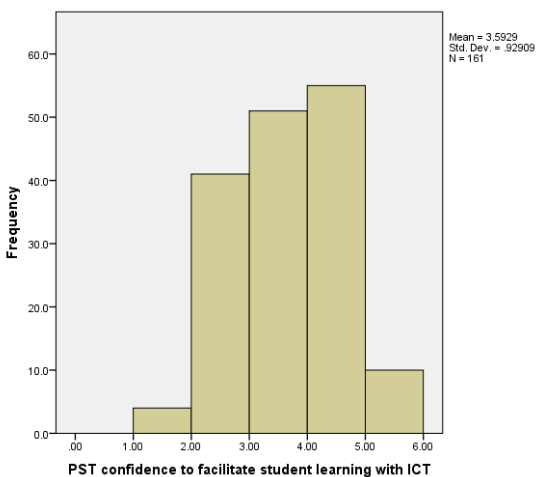


Figure 3 PST perception of usefulness of ICT when teaching



Perceived confidence in using ICT

The confidence of those interviewed followed a similar pattern to the survey data with the interview responses providing additional detail. Five of the interviewees expressed feelings of confidence in their ability to use ICT, while one student indicated that her ability was limited to basic to word processing procedures. Those who were highly competent also expressed that they were comfortable using new technologies as is supported by the following comment: *“I have taught myself a lot about a range of different ICTs...I have no problem with something I haven’t used before”*. Although highly confident with ICT for personal and academic use, she felt less confident in her ability to use ICT for the first time in the classroom. Another student felt that if she was not able to teach herself a new technology she knew where to go for help. There was general agreement that students felt less confident when using ICT applications in educational settings.

Beliefs about ICT

The three interviewees who were particularly confident in their use of ICT also conveyed very positive attitudes towards the implementation of ICT in the classroom. *“I suppose having a good attitude toward ICT helps as well like I can see the purpose and the benefit for using ICT”*. Another student expressed the thought that *“I just think ICTs can engage students so much and give them opportunities to learn things in different ways, so why wouldn’t you make an effort to use technology in the classroom?”* Those who were confident users were able to justify ICT integration in the classroom. However, all interviewees were positive about the usefulness of ICT in the classroom which was the same as the results of the survey.

Classroom use of ICT

The interviewees were able to give insightful information about their own practice of ICT integration on their placements. ICT was primarily used for teacher instruction and for planning and administration. One student indicated that she had only used PowerPoint as a medium to introduce a topic. All pre-service teachers used ICT for classroom planning on a daily basis. *“I also used ICTs to search the Internet for ideas for my lesson plans and unit plans...I would use forums where teachers discussed the best way to teach certain ideas”*. Half of the interviewees indicated that they did not use ICT for administrative tasks, but tended to use paper and pen. Using ICT for administrative tasks helps to further develop pre-service teachers’ knowledge of software, while also saving them time.

There were however examples of more innovative uses of ICT in the classroom. The three more competent students described their use associated with tools and resources available through the interactive whiteboard, a typical response was, *“I made a template for procedure writing which I displayed on the interactive whiteboard. I modeled writing a procedure, then, as a class, we jointly constructed a procedure”*.

Pedagogically sound practice using ICT

All interviewees were able to share their personal interpretation of effective use of technologies and whether they understood this as using ICT in pedagogically sound ways. One student explained: *“Pedagogically sound practice to me means using pedagogy to engage students and connect with them and make [learning] meaningful”*. Another student suggested that *“good ICT use is when ICT is used as more than a replacement for pens and paper and it’s more than a way to make a lesson interesting”*. The interviewees recognized that ICT must be used in ways that will enhance student learning through improved engagement and motivation. As a tool it is the way that ICT is integrated into their teaching that will make a difference to student learning

Positive and negative influences on ICT integration

These influences were categorised using the themes of: school based placements, university-based experiences and professional development.

School based placements

The interviewees indicated high levels of confidence in using ICT in the classroom if they had also used them in their personal life. If pre-service teachers had low levels of ICT experience they felt unable to use ICT in pedagogically sound ways. They also felt that their mentor teacher played a significant role in their use of ICT in the classroom. Their mentor's confidence and competence with ICT determined whether ICT integration was a positive or negative experience. The following comments reflect some of their experiences: *"My mentor was a specialist in ICT so we had more access to ICTs than most other teachers"*; *"My mentor teacher didn't help with ICTs...but I guess technology wasn't her strong point"*; *"On my pracs if I haven't seen the teacher using ICTs, I won't use it."* Albion (2000) suggests that in order to facilitate the successful integration of ICT, pre-service teachers should be placed with mentor teachers who are "confident, competent and consistent users of ICTs" (p 758). The mentor teacher needs to be able to provide examples of best practice. Several pre-service teachers felt that the development of their ICT skills had not been aided by their school based placement. *"Most teachers I saw didn't really incorporate ICT into their teaching in any real meaningful way"*.

As the school-based placement was not only a learning experience, but was also part of their formal assessment they were wary of experimenting with technology and putting themselves at a disadvantage in their placement report. Pre-service teachers did not feel supported in utilising new ways of using technology in the classroom. Also there were access and time constraints that further inhibited integration into the classroom. *"Something I didn't fully take into consideration was being able to have the same software at home to prepare materials to use on the interactive whiteboard."* A number of pre-service teachers specifically expressed her concern about replicating the planned lesson when the technology did not work. *"In terms of behavior management, when you have the kids just sitting there waiting for two or three minutes while you fiddle around with the board, well it's not a good thing"*.

University based experiences

There was variation in pre-service teachers' perception of their university-based experiences to assist in their development of ICT skills which was closely linked to their confidence levels and the courses studied whilst at university. All pre-service teachers had completed the ICT core course which they felt reinforced skills they already had, but it did not assist with developing pedagogically sound practices for ICT integration. One comment suggested that the course was too early in their program as they had not had a chance to understand the role of ICT in the classroom. Albion and Redmond (2008) recommend that an ICT course should address the pedagogical use rather than focus on skill development. *"I know we did an ICT topic, but that was back in first year and honestly, I didn't know what I was doing in terms of teaching and my role in the classroom"*.

Beyond the core ICT course, pre-service teachers wanted university staff to provide more examples of 'best practice', however for this to occur the staff would need to be skilled users. They reported mixed observations of the staff's ability to provide effective examples of good teaching strategies. *"I am not sure that what they say about integrating ICT into our lessons is really being demonstrated in the uni classroom"*.

Professional development

Professional development was recognized as providing learning opportunities that were absent from their teacher education program and school based placement. One example was a pre-service teacher who had attended a session on interactive whiteboards *"I have attended professional development in using a Smartboard, so in that way I see the purpose of using technology because I*

feel more confident about it". A number of the interviewees spoke about this as being the beginning of the journey as a lifelong learner.

Conclusion

From this study perceived confidence, attitude and use with ICT emerged as key factors influencing the integration of ICT in the classroom. The pre-service teachers recognized the usefulness of ICT in teaching and learning, but were not as confident in their ability to implement it. This study supported the importance of the school based experience and in particular the support by a skilled mentor was found to be a deciding factor on influencing current and future ICT use in the classroom. The university based experiences were reported by the pre-service teachers to have had little effect on preparedness to implement ICT in their teaching. This highlights the need for good examples of ICT integration within their university courses.

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