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Author

Finger, Glenn, Charleston, Deborah, Withington, Ros, Pugh, Lara

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***Conceptualising the Information and Communication Technologies
(ICTs) Journeys of Future Teachers and Practising Teachers:
Findings, Challenges and Reflections***

Dr Glenn Finger
*School of Education and Professional Studies
and Centre for Learning Research
Griffith University, Australia
Email: G.Finger@griffith.edu.au*

Deborah Charleston, Ros O'Brien, and Lara Pugh (B.Ed. Primary Honours students)
*School of Education and Professional Studies
Griffith University, Australia*

Address for correspondence:

Dr Glenn Finger
School of Education and Professional Studies
Gold Coast Campus, Griffith University
PMB 50 Gold Coast Mail Centre
Queensland 9726 Australia

Telephone +61 (0)7 5552 8618
Facsimile +61 (0)7 5552 8599
Email G.Finger@griffith.edu.au

Abstract

As documented by MCEETYA (2002) and Finger and Trinidad (2002), all Australian States and Territories have embarked upon systemic Information and Communication Technologies (ICTs) initiatives. Those initiatives represent evidence of growing momentum in the changing expectations of schools and school systems to require teachers to undertake a professional development journey which enables the successful integration of ICTs, referred to here as the ICTs Journey. This paper, in providing a conceptualisation of that ICTs Journey as requiring effective pre-service teacher education and continuing professional development in ICTs, draws upon recent major Australian reports Making Better Connections (DEST 2001) and Raising the Standards (DEST 2002) aimed at driving the ICTs agenda further. In addition, this paper provides a summary of key findings from the research undertaken by three Bachelor of Education (Primary) Honours students. This research focused on illuminating and identifying challenges posed by the ICTs journey for future teachers, teachers in their first years of teaching, and for more experienced, practising teachers. Specific investigations were conducted with teacher education students in their third year of preservice teacher education, teachers in their establishing phase of teaching, and experienced teachers who had undertaken a formal, 3 day ICTs professional development program. Implications are identified for preservice teacher education and continuing professional development in terms of the ICTs journey. Finally, reflections are presented by the three Honours research students in terms of the tensions and personal sacrifices made in choosing to undertake research during their preservice teacher education. As co-authors of this paper, this paper highlights the demands upon these student teachers in not only undertaking their own ICTs Journeys but also the intellectual demands and potential rewards of accompanying that ICTs journey with their intensive research journeys.

Introduction

Why undertake research when all I want to do is teach?

I don't think that I can afford the time for my Honours research when I have so many demands on me to make sure that I do well with my pracs.

I'd like to find out more about why teachers have trouble integrating computers in schools.

Do kids really do better if they use computers?

Will I be well prepared to integrate ICTs in my classroom when I become a teacher?

How can I continue to learn more about ICTs?

These are questions, thoughts and concerns raised in discussions between three Bachelor of Education (Primary) Honours students and their supervisor. Those comments highlight the tensions which teacher education students face in determining both whether or not they wish to pursue research within their preservice teacher education program and their initial thoughts on selection of a research area. Importantly, this paper provides an opportunity for those three Bachelor of Education (Primary) teacher education students undertaking their Honours research program to share their research. In times when few students seem to be embarking on research in their undergraduate programs within our teacher education programs and the associated challenges posed by research, opportunities to share such as that provided by the Australian Association for Educational Research (AARE) in helping to build a research culture for early career researchers is critically important. Furthermore, we argue that the selection of the research and the resulting intellectual processes has the potential for substantial professional growth of these early researchers in terms of both their research and their information and communication technologies (ICTs) journeys. In terms of setting a context, the three students together with their supervisor have worked collegially through focusing on ICTs in formulating their research questions. This paper outlines some key findings from our research in order to conceptualise the ICTs journey for future teachers and practising teachers.

Context of the Research

a) Preservice Teacher Education

The preservice teacher education program referred to in this paper is a four year Bachelor of Education (Primary) program in which students undertake one core course called *Learning with ICTs* and one core course in Technology Education and can elect to undertake a Learning Technology major which requires an additional four semester length courses. In *Learning with ICTs* students are provided with theoretical and practical orientations which aim to prepare them to integrate ICTs in their curriculum programs.

b) Continuing Professional Development Model - What is the LDC-ICT?

Within the context of heightened systemic ICT initiatives throughout the Australian States and Territories, Education Queensland has commenced *Education and Training Reforms for the Future* (ETRF) (Queensland Government, 2002) with *ICTs for Learning* (Queensland Government, 2002) projects. ICTs are one of the three major components of the ETRF with the Queensland Government committing \$23 million in addition to the existing \$36.4 funding for 2002-2003 and a further \$35 million will be made available in 2003-2004 to improve ICT access and ICT skills of students and teachers (Queensland Government, 2002, p. 4). Eight systemic projects to support *ICT's for Learning* are outlined (Queensland Government, 2002, pp. 34 – 37) - School ICT Profile Project, Performance Measures Project, Systemic ICT Procurement and Service Delivery Project, ICT Support Project, Online Examples of ICT Curriculum Integration, Community Access to ICTs in Schools, Learning and Development Centres (Learning Technology), and The Learning Place. This paper focuses on research which centres on the professional development activities undertaken by practising teachers at what is now referred to as the *Learning and Development Centre – Information and Communication Technologies* (LDC-ICT) at Burleigh Heads State School. To complement the research on practising teachers, some research findings relating to student teachers in their third year of a four year Bachelor of Education (Primary) are also presented.

The LDC-ICT was established at Burleigh Heads State School during 2000 by Education Queensland to “provide localised and sustainable professional learning opportunities for teachers through the delivery of programs that are designed to meet the needs of the teachers” (Education Queensland, 2001). The LDC-ICTs, which are located in school settings, provide face-to-face sessions for teachers that include exemplars of classroom practice (Education Queensland, 2001). In establishing the LDC-ICT, additional resources were acquired including an additional computer room to accommodate the Practicum participants to be invited from other schools, the provision of additional ICT resources for the teachers and the classrooms involved in the project, and a Coordinator for the LDC-ICT was appointed with key roles in planning and conducting the practicums and liaising with classes at Burleigh Heads State School (Finger et al, 2002, p. 3). In summary, the LDC-ICTs were designed to promote ICTs for learning through providing practising teachers with a practicum experience whereby teachers learn how to effectively integrate ICTs into their classrooms. Those practicums involve the participating teachers visiting and viewing classrooms in action at Burleigh Heads State School.

The brief and learning outcomes for the Teacher Practicums were provided by Education Queensland (Education Queensland, 2001) as follows:

- Teacher Practicums are generally a three-day program that focuses on teaching and learning with technology. Conversations about technology and teaching are starting to change. Instead of talking about computers, educators are talking about how the technology can support effective learning and teaching.
- During practicums participants will be provided opportunities to discuss, explore and view what happens when students use technology as a tool for building their own knowledge. They will also look at how teachers can use technology to create more

challenging learning environments and participate in discussions about staff development and school change. They will be encouraged to reflect on their current practice and develop a project to share their observations and experiences with their students and fellow staff members.

b) Catalyst for the Research

A contributing catalyst for this research was a study conducted by Finger et al (2002a, 2002b) which sought to map students' ICT use throughout their involvement in the ICT enhanced classrooms. Among the major findings of that study was that students were responding well through the increased use of ICTs in their classrooms, and their skills and knowledge of ICTs increased during the first year of the school hosting the LDC-ICT. Finger et al (2002a, 2002b) reported increases in student use of ICTs in terms of their learning *for* technology and learning *through* technology developed from the work of Atkin (1997). As the study investigated the student use of ICTs during 2001, Finger et al (2002) suggested further research of those classes to provide more in-depth descriptions and analyses of the changes in those classrooms which had occurred through the enhanced ICT integration. It is important, therefore to follow up on this study to see if students still were reaping the benefits and to document ways in which ICTs were being integrated in the classrooms. Furthermore, the Coordinator of the LDC-ICT raised questions relating to the transfer of skills and knowledge, which teachers gained during the practicum, to their respective classrooms and schools. Thus there was an emergent research challenge to investigate the value of the LDC-ICT as a professional development model for those practising teachers who had attended the practicum. For example, did the practicum result in changed use of ICTs by the teachers when they returned to their schools?

An additional catalyst was the significant Australian studies which had also raised doubts about the effectiveness of preservice teacher education in preparing teachers to use ICTs (see Meredyth et al, 1999; DEST, 2001) and the proposal for the development of a national ICT competency framework (DEST, 2002) predicated on the belief that while "The need to better exploit the teaching and learning potential of ICT is widely accepted and supported. ... this potential has not been realised in any significant way" (DEST, 2002, p. 3). In particular, the *Making Better Connections* report (DEST, 2001) which surveyed Australian universities, indicated that:

"...a great deal of difficulty was encountered in presenting student teachers with valid and meaningful examples of ICT classroom use as part of their school experience. In the survey, course coordinators commented upon the large difference between what was learned about classroom applications of ICT in the university setting and what was practised in field placements." (DEST, 2001, p. 40)

Moreover, that report noted that "With the separation of pre-service programmes from induction and beginning classroom teaching experience, it is very difficult to measure the effectiveness of their work beyond the end of the teacher education course" (DEST, 2001, p. 59). For the purpose of conceptualising the linkages between preservice teacher education in ICTs, beginning teachers, and experienced practising teachers, this paper adopts the concept of future teachers and practising teachers participating in an ICTs journey.

Finally, the three research students were motivated to pursue research related to ICTs due to their personal commitments to being 'well prepared' to integrate ICTs effectively in their future classrooms. There was an interest in helping to 'make the connections' between preservice preparation and their continuing professional development in ICTs alluded to in the *Making Better Connections* report (DEST, 2001).

c) ICTs Journey in Queensland

As documented by MCEETYA (2002) and Finger and Trinidad (2002), all Australian States and Territories have embarked upon systemic ICTs initiatives. Those initiatives represent

evidence of growing momentum in the changing expectations of schools and school systems to require teachers to undertake a professional development journey, referred to here as the ICTs journey. This paper, in providing a conceptualisation of that ICTs journey as requiring effective pre-service teacher education and continuing professional development in ICTs, draws upon recent major Australian reports *Making Better Connections* (DEST 2001) and *Raising the Standards* (DEST 2002) aimed at driving the ICTs agenda further. Specific emphasis is placed on the Queensland setting whereby future teachers and practising teachers are required to meet the *Minimum Standards – Learning Technology* (Education Queensland, 1997) and are encouraged to use the *ICT Continua* (Education Queensland, 2003) as a self-reflection framework to move beyond the *minimum standards* through *developmental*, *innovator* and *leader* phases (see Education Queensland, 2003). The conceptualisation adopted here is that provided by *Raising the Standards* (DEST, 2002, p. 21) and displayed in Table 1 below:

Table 1: Conceptualisation of the ICTs Journey

(Source: DEST, 2002, p. 21)

Dimensions of ICT Use	Stages of ICT Development	Target Groups
ICT as a tool for use across the curriculum or in separate subjects where the emphasis is on the development of ICT-related skills, knowledge, processes and attitudes.	Minimum	Underpins all teaching practice in the same way as other literature
ICT as a tool for learning to enhance students' learning outcomes with the existing curriculum and existing learning processes.	Developmental	For beginning teachers and practicing teachers beginning to use ICTs
ICT as an integral component of broader curricular reforms that change not only how students learn but what they learn.	Innovator	For practicing teachers who are accomplished/highly accomplished users of ICT.
ICT is an integral component of the reforms that alter the organization and structure of schooling itself.	Leader	For school and educational leaders and for other teacher educators

This research focused on illuminating and identifying challenges posed by the ICTs journey for future teachers, teachers in their first years of teaching, and more experienced teachers who had undertaken the ICTs practicum professional development at the LDC-ICT located at Burleigh Heads State School. Each of the three Honours students identified a researchable task to be undertaken separately from each other with the aim of collectively synthesising their findings and implications for the professional development of teachers in integrating ICTs. The three research tasks aimed to:

1. Identify the implications for preservice teacher education and continuing professional development of teachers in their early teaching careers (less than 3 years) in terms of their ICTs Journey;
2. Investigate whether or not practising teachers who had undertaken a formal, 3 day ICTs professional development program at the LDC-ICT had improved student use of ICTs following their practicum experience; and
3. Provide insights into the ICT integration of classrooms within the LDCT-ICT.

Finally, reflections are presented by the three Honours research students in terms of the tensions and personal sacrifices made in choosing to undertake research during their preservice teacher education. As co-authors of this paper, the demands upon these student

teachers are highlighted in terms of not only undertaking their own ICTs journeys but also the personal and intellectual demands and potential rewards of accompanying that ICTs journey with their intensive research journeys.

Research Methods Employed

A variety of research methods were employed. These included surveys of third year teacher education students, surveys of practising teachers who had attended the LDC-ICT practicum, interviews with teachers, observations of teachers and students in classrooms at the LDC-ICT, surveys of parents of students in the LDC-ICT classrooms studied, analysis of LDC-ICT teacher's planning and class projects, interviews with students in those classrooms, and examination of student work samples.

Key Findings

Our research is still works in progress which will result in three Honours theses. This section reports some of the key findings from our research related to:

1. Preservice Teachers;
2. Practising Teachers who had attended the LDC-ICT practicum; and
3. 2 Focus classrooms at the LDC-ICT.

1. Preservice Teachers

Student teachers in their 3rd year of a 4-year program of study were surveyed to gain information about aspects of their preservice teacher education program in relation to ICTs. As displayed in Figure 1, there had been a positive increase in the interest among those students with 73% now interested to either a great extent or a very great extent compared with only 33% reporting that they were interested in ICTs for learning to a great or very great extent before their preservice teacher education program. While one out of every 5 students indicated that they were interested to either little extent or not at all in ICTs before their preservice program, now only 4 % were interested at those low levels.

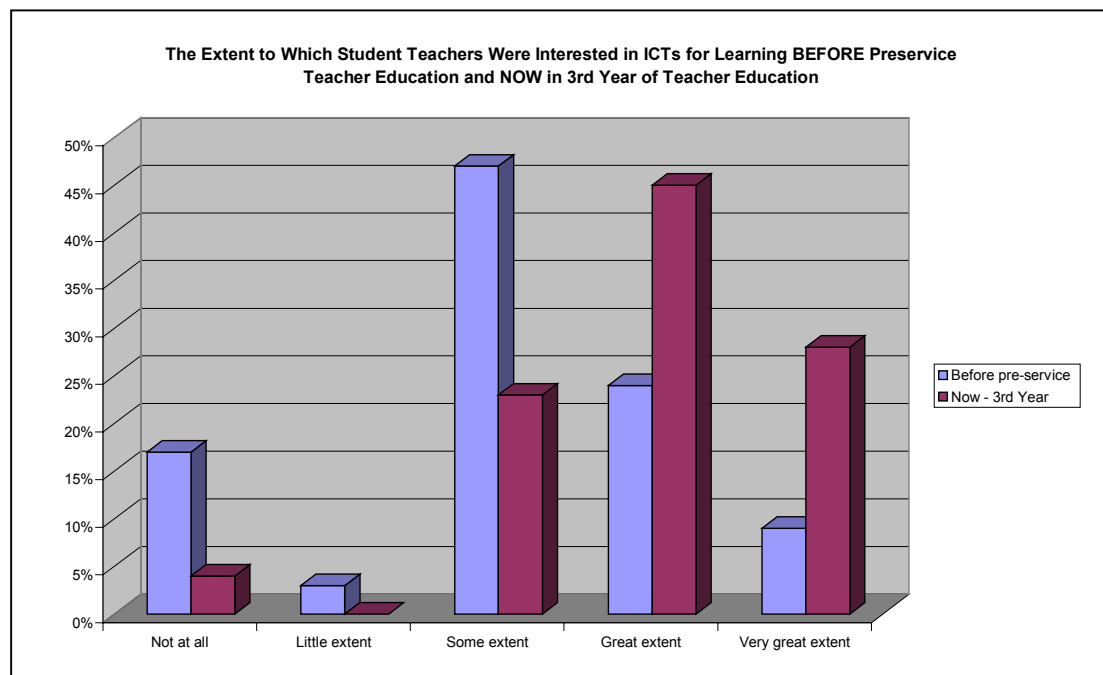


Figure 1: The Extent to Which Student Teachers were Interested in ICTs for Learning BEFORE Preservice Teacher Education and NOW in 3rd Year of Teacher Education (N = 97 third year teacher education students)

By their 3rd year, most of the students surveyed had been involved in at least 4 Professional Studies programs often referred to as ‘pracs’. These included Professional Studies and Practice (PSP) 1 – 5 days, PSP 2 – 5 days, PSP 3 – 10 days, PSP 4 – 10 days as well as some preprac visits to schools. That is, most students surveyed had undertaken a minimum of 30 days of visits to schools. During those visits, the student teachers were assigned various tasks, including observing their supervising teachers as well as planning and teaching lessons with students. The classrooms were in schools which were predominantly Education Queensland government schools which had required that all teachers were integrating ICTs in all curriculum areas by 2001. The student teachers surveyed were asked to indicate the extent to which they believed that it was essential to observe teachers integrating ICTs. In addition, the student teachers were asked to indicate the extent to which they observed teachers integrating ICTs. As shown in Figure 2 below, there were discrepancies between their expectations and what they observed. Disturbingly, only one out of every ten student teachers reported that they observed ICT integration to a great or very great extent, while more than 60% only reported not seeing ICTs integrated at all or integrated to only a little extent. Given the strong suggestion in the *Making Better Connections* report (DEST, 2001) that student teachers should be exposed to positive experiences in seeing ICTs being integrated in school settings during their field visits, these findings are extremely disappointing. Together with the improved levels of student teacher interest in ICTs for learning (see Figure 1 above), there seems to be a considerable mismatch between high levels of student teacher interest in ICTs and belief in the importance of observing ICT integration in school settings, and low levels of observing ICT integration in action in schools.

**Table 2: Student Teachers – Observing ICT Integration in Classrooms
(N = 97 third year teacher education students)**

Statements	Not at all	Little extent	Some extent	Great extent	Very great extent
The extent to which student teachers believe it is essential to observe teachers integrating ICTs	5%	5%	32%	42%	16%
The extent to which student teachers observed ICT integration	26%	36%	26%	9%	3%

It would seem that considerable improved ICT integration is required of practising teachers. Questions need to be asked related to how effective or ineffective those teachers’ professional development has been to improve ICT integration.

Practising Teachers Who Had Attended the LDC-ICT Practicum

As outlined earlier in this paper, the LDC-ICT was an initiative by Education Queensland to attempt to address teachers’ professional development with the aim of enabling teachers to effectively integrate ICTs. Utilising the framework of investigating *Learning for Technology* and *Learning through Technology* employed by Finger et al (2002a; 2002b), 83 teachers who had attended the LDC-ICT practicum were surveyed and information was sought relating to the extent to which students used ICTs in their classes before and after the teachers had attended the practicum. Table 3 displays the *Prior to* and *After* means for *Learning for Technology* and *Learning through Technology* items. After the practicum, in terms of *Learning for Technology*, improvements were reported by teachers for all items related to skill development, attitudes, and experiences of students in using ICTs. Similarly, for items related to Learning through Technology, improvements in student use of ICTs were reported by teachers after their attendance at the practicum for better access to information, enhanced communication, increased ownership, rich experiences and expression, and motivation. Overall, there appears to be improvements in the student use of ICTs after the teachers

attendance at the practicum which might suggest a positive impact in improved ICT integration.

Table 3: Level of ICT Integration *Prior to* and *After* attending the LDC-ICT Practicum (N = 83 practising teachers who had attended the 3 day LDC-ICT Practicum)

Learning for Technology	<i>Prior to attending the Practicum</i>	<i>After attending the Practicum</i>
<i>Skill Development</i>		
Students use ICT to access information?	3.71	4.26
Students use email.	2.69	3.14
Students help other students in using ICT.	3.89	4.37
<i>Attitudes</i>		
Students feel comfortable using ICTs.	3.93	4.38
Students use ICTs by themselves.	3.73	4.19
<i>Experiences</i>		
Students understand how to use new software.	3.25	3.75
Students choose to use ICT to help them do their work.	3.54	4.1
Students feel confident using ICTs to do their work.	3.68	4.19
Students identify the reason they are using ICTs to complete their work.	3.38	3.81

Learning through Technology	<i>Prior to attending the Practicum</i>	<i>After attending the Practicum</i>
<i>Better Access to Information</i>		
Students decide whether or not ICT delivered information is true.	2.90	3.17
<i>Enhanced Communication</i>		
Students choose to work with others and listen to their ideas when completing tasks.	3.60	3.95
Students use ICT to communicate with people outside school.	2.74	3.27
<i>Increased Ownership</i>		
Students have displayed more care with their work when completing a task using ICT.	3.45	3.48
Students see how the use of ICT can add other dimensions to their presentations.	3.60	4.54
Students have a say in the planning of activities we do in class.	3.45	3.83
<i>Rich Experiences & Expression</i>		
Students see the real life purposes for their work using ICTs.	3.55	4.09
Students know which higher order thinking skills they use.	2.81	3.19
Students use ICT to solve problems.	3.02	3.38
<i>Motivation</i>		
Students feel enthusiastic about learning using ICTs.	4.14	4.50
Students feel as capable as other students when using ICT.	3.39	3.93
Students feel that what they are learning using ICTs will help them in the future.	3.72	4.08
Students are interested in what other students do with ICT.	3.92	4.53

Scale: 1=strongly disagree; 2=disagree; 3=neutral; 4=agree; 5=strongly agree

Focus Classrooms

The establishment of the LDC-ICT at Burleigh Heads State School required teachers to undertake personal and professional journeys to explore implications of enhanced ICT integration for changes in curriculum, pedagogy and assessment. Through the use of that conceptualisation of the dimensions of ICT use (see Table 1), this research aimed to provide rich insights, descriptions and analyses focusing on two classrooms guided by the following key research question - What dimensions of ICT integration are evident in the focus classrooms? In examining that question, the level of sophistication underlying the classroom integration of ICTs was investigated. In addition, the following supporting research questions also guided this study. What are effective classroom practices in which students use ICT's for learning? What implications do ICT integration hold for changes in curriculum, pedagogy, and assessment?

Intensive observations were undertaken and rich descriptions were developed of those two focus classrooms within the LDC-ICT. Access was gained through gaining permission, development of trust between researcher and teachers. Through viewing and discussing the transactions and negotiations which occurred in the teacher planning, the modifications, and the intended and the unintended classroom activities, the 'voyage of discovery' seemed an appropriate way to describe the use impact of ICTs in those classrooms.

There were observable characteristics that are commonly attributed to the influence of constructivist theories similar to those described elsewhere by Roblyer (2003, p. 70) viz.

- Problem-orientated learning activities that are relevant to student interests and that require some time, a variety of skills, and several people working together to solve.
- Highly visual formats such as those made possible with videodisc and multimedia materials.
- "Rich" learning environments that use a variety of resources, such as electronic encyclopedias, construction kits, and laptop computers, and contrast with the "minimalist" classroom environment that usually relies primarily on teacher, textbook, and prepared materials like worksheets.
- Collaborative and cooperative group work.
- Learning through exploration, with an emphasis on the process of problem solving rather than on getting the right answer.
- Authentic assessment methods with qualitative (e.g. portfolios, teacher narratives, and performance measures) rather than quantitative (e.g. objective pencil and paper tests) strategies.

An extremely interesting example of those characteristics was evident in the Hipi Unit which was developed from the following event:

"6R has had their computer pet Hipi kidnapped. He disappeared between the hours of 3.25 p.m. August 1 Wednesday and 8.45 a.m. August 2 Thursday. A note was left on his computer, click on the kidnappers button above to view the note. 6R is interviewing suspects and checking alibis to help solve this mystery. ...help 6R discover where Hipi went. Email us if you would like to help." (Burleigh Heads State School, 2002)

Students were given a problem to solve, they searched for clues, developed a list of suspects, gathered evidence, investigated leads, and finally conducted their trial of the chief suspect who was the LDC-ICT Coordinator. As portrayed on the Hipi website (see Burleigh Heads State School, 2002), examples of student work displayed there includes an iMovie of Hipi's kidnap, Quicktime VR of Hipi, Panorama of Hipi's hideout, students' Hyperstudio stacks, morphing showing teachers morphing into Hipi, and songs with lyrics written by the students. The qualitative data provided rich insights into the ways in which ICTs were being integrated

through a process of experimentation and exploration by the teachers and the students as they modified the original planned intentions of units of work. This data complemented quantitative data gained to build on the previous findings reported by Finger et al (2001, 2002) which mapped student use of ICTs in Learning *for* Technology and Learning *through* Technology dimensions to show a continued, increasing use of ICTs by students for curriculum tasks.

Research and ICTs Journey Reflections – Voices of the Honours Students: Tensions and Triumphs

The most beneficial aspect has been making the links between our research journeys and our personal ICTs journeys. In particular, through our review of the literature and attempts to come to an understanding of the challenges of providing effective preservice teacher education and the need for effective continuing professional development of teachers in ICT, we've made some sense of coming to understandings that there is a nexus between the research and ICTs journeys. This has been intellectually beneficial. Our awareness of the international literature on ICTs integration and professional development of teachers has enabled a deeper understanding of our own professional development needs. The benefits have been our own personal growth in ICTs skills, knowledge and understandings which we believe will become strong aspects of our potential to contribute to ICTs in the schools we will work in through our future roles as teachers.

Given that each of us has had the usual demands of family traumas, and academic demands from courses, we often felt that the easier journey would be to withdraw. Several times we have all spoken with our supervisor and forwarded off the email threatening to withdraw. We understand why we are the only 3 students from a cohort of more than 100 students undertaking the Honours program. Using the metaphor of the journey, we collectively have experienced the 'speed bumps' through the academic rigour required by research, and individually had to design our own road maps. There were no easy directions to follow, and our journeys are far from over.

Conclusion

This paper has provided a summary of some of the key findings from the research undertaken by three Bachelor of Education (Primary) Honours students. This research highlighted some of the challenges posed by the ICTs journey for future teachers, and for more experienced, practising teachers. While student teachers reported increased levels of interest in ICTs for learning since entering their teacher education program, and indicated that they believed that they should observe ICT integration during their practicum visits in schools, most student teachers reported that this did not occur to any great or very great extent. An investigation of the impact which the LDCT-ICT had in terms of professional development for practising teachers to enhance their integration of ICTs suggested that teachers who had attended the LDC-ICT practicum reported increase use of ICTs by their students following the practicum experience. The focus LDC-ICT classrooms demonstrated characteristics of constructivist approaches, student use of a wide range of ICTs, and a wide variety of forms of student developed multimedia products. Finally, reflections were presented by the three Honours research students in terms of the tensions and personal sacrifices made in choosing to undertake research during their preservice teacher education. As co-authors of this paper, this paper highlighted the demands upon these student teachers in not only undertaking their own ICTs Journeys but also the intellectual demands and potential rewards of accompanying that ICTs journey with their intensive research journeys.

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