Future Focussed Teacher Education: Proceedings of the SITE International Symposium

28 & 29 April 2014, University of Canterbury, Christchurch, New Zealand

Lawrence Walker & Lindsey Conner, Editors

International Symposium Chaired by Niki Davis
Welcome to the 2014 SITE Symposium

Nau mai rā, e te manuhiri tūārangī ki te whare wananga o waitaha

We are delighted to welcome you to this SITE Symposium at a time when there are many contesting drivers and demands within initial and on-going professional learning for teachers and hence teacher education at the forefront of teacher learning. Over recent years we have substantially lifted the quality of New Zealand’s teacher education through continual review and renewal. We need to continue to raise our game and further develop our internationally respected, perhaps leading teacher education programmes to include contemporary learning and teaching approaches using digital technologies. This symposium will provide impetus for the next steps to help our visions and aspirations come to fruition.

Our keynote speakers are set to challenge us about how genuine integration of ICT requires intentional planning and follow-up with assessment and reflection. Many of the papers and posters at this symposium provide examples of using digital technologies and evaluate the use or pedagogical considerations and appropriateness of incorporating these into ITE. There is some promise that incorporating specific software and web 2.0 tools enhances students’ motivation, engagement and satisfaction, and that they can contribute to the development of digital knowledge and use across geographically dispersed learning communities and for a range of learning contexts and subject areas. Our own reflection on how well these led to student outcomes is evident in many of the papers and posters. Reflective practice and some subject specific areas are very amenable for using digital technologies as showcased in particular papers. Of interest in several contributions, is the identification of assumptions we make about students’ prior knowledge and skills, as if they are already very familiar with the use of technologies for teaching. In most cases our students are not as experienced as we expect. So, constructivist and social constructivist approaches, where we help students to identify their needs, are more likely to support active learning and a sense of developing a ‘community of learners’. Even more heartening is the collaborative nature of many approaches within ITE to include digital technologies. The symposium itself and the sharing of these ideas will enable us to take advantage of relationships across organisations and also with international contributors as we move forward with these ideas.

The submissions in this symposium also reflect our wider expectations for tertiary education to improve outcomes for individuals and society as a whole, especially when we consider the influence of teachers on future generations and the ways in which teacher education supports groups of people to access and develop skills needed in our emerging digital world. Perhaps you have more questions for future research as an outcome. We are very grateful for your thoughts, research, reflections and contributions to our discussions.

Thank you all for your contributions to this symposium!

Lindsey Conner and Lawrence Walker
Proceedings Editors

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Niki Davis, Chair, University of Canterbury (SITE Exec; DEANZ Exec)
Julie Mackey, University of Canterbury, Dean of Education
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Sandra Williamson-Leadley, University of Otago (TEFANZ)

Website: http://www.education.canterbury.ac.nz/site-symposium/
SITE is the Society for Information Technology & Teacher Education, and its mission is to promote research, scholarship, collaboration, exchange and support. A link to SITE is: http://site.acce.org

SITE has generously sponsored Associate Professor David Gibson as one of our keynote speakers. A link to David’s Curtin University page is: http://otl.curtin.edu.au/global/dir_directors.cfm/David.C.Gibson

SITE has a world-wide membership with some 54 different nationalities attending the annual conference. As a Past President Professor Niki Davis is on the executive and Lawrence Walker held the SIG post of Assistive Technologies Chair and co-chair 2010-2014. A number of staff members from New Zealand and Australian Universities attend the conferences regularly.

Proceedings also published in the EdITlib. www.editlib.org

TEFANZ is made up of member organisations within New Zealand tertiary institutions. It holds a biannual conference and has been generous in supporting member organisations through a scholarship system. A link to TEFANZ is: http://www.tefanz.org.nz

The committee is very appreciative of the support from SITE, TEFANZ and the University of Canterbury for help in running this Symposium. We wish to thank our keynote speakers: Dorothy Burt and David Gibson and all who have helped make this Symposium possible.
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Abstracts

Symposium briefing paper

Future Focussed Teacher Education: Why we Need to Inspire with Digital Technologies
Niki Davis
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The paper introduces the background to information technology and initial teacher education and need for this international symposium in the Asia Pacific region with the support of the international Society of IT and the Teacher Education (SITE) and the Federation of Aotearoa New Zealand (TEFANZ). It aims to explore and collate future focussed research and practices in order to help inform the rapid development of digital technologies in education, locally, nationally and internationally. The topic of digital technologies in initial teacher education is particularly relevant in New Zealand at a time when access to digital technologies is increasing nationwide through Ultrafast Broadband and a national ‘Network for Learning’ that aims to increase international networking and promote more innovative approaches and networked learning. The paper concludes with the author’s call to action that started in 2011, which is met in part by this international symposium.

Monday 28 April
1:30pm Working Group Presentations Session 1

Pre-service Teachers’ TPACK Confidence in a Regional Australian University
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The extent of transformation of education by integration of ICT appears not to match that in other sectors. More effective preparation of teachers is widely assumed to be part of any solution, leading to interest in what knowledge, skills and dispositions are required of teachers and how best to develop those. The Australian Teaching Teachers for the Future (TTF) project appears to have demonstrated some success in enhancing pre-service teachers’ TPACK confidence. This paper presents data from a regional Australian university where the change appears to have preceded implementation of TTF and considers factors that may have contributed to that change.

Educational Design for Experiential and Authentic Learning: Case Study of the Use of e-Portfolios for Assessment
Lindsey Conner
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University of Canterbury, New Zealand

This paper reports on how student teachers in a Graduate Diploma biology class used electronic portfolios for recording their experiences of authentic practice and learning. The study focuses on students’ unprompted reflections that were part of a summative assessment and categorises how often students reflected on ways to learn content knowledge, and evaluate pedagogy and resources, as well as make links with their observations of associate teachers, school students’ class work and their own teaching development. The analysis is discussed in terms of the students’ comments and the implications for adjustments to the guidelines for the associated assessment so that student teachers are encouraged to become more aware of how they can learn through observation of class activities (both initial teacher education and school class observations) and include more reflections on the evidence of student learning to inform next practice.

Going Digital in Stuck Places: Secondary Graduate ITE Students’ Practicum Experiences with Trying to Use Digital Technologies
Noeline Wright
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This paper concerns issues that secondary graduate pre-service teachers report regarding integrating digital technologies into at least a small proportion of practicum lessons. ITE students’ reports outlining their experience in response to designing a learning purpose for, and using a digital technology in, at least one lesson during practicum is the data source, generated from Moodle and myportfolio postings over two years from two cohorts (approximately 160 students) in consecutive graduate programme years. Findings link to the roles of ITE educators and associate teachers in supporting pre-service teachers to experiment with digital technologies in school learning contexts.horts (approximately 160 students) in consecutive graduate programme years.
Monday 28 April
2:30pm Working Group Presentations Session 2

Using Technology Enabled Feedback in Initial Teacher Education

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Formal assessment tasks such as assignments and exams, within the typical teaching and learning model in university settings, enable summative judgments to be made about students’ level of learning. Less common is the use of assessment to provide the kind of formative feedback that helps lecturers support and guide students’ learning, and less common still is feedback on learning from the students to the lecturer. This paper presents six case studies highlighting how mobile technologies and Web 2.0 applications can be leveraged to facilitate feedback from students and teachers. As lecturers, our use of this feedback exemplifies pedagogies that emphasise active participation in meaningful communities of learning and inquiry.

A Self–Study Driven by Technology but Dominated by Pedagogy

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This paper reports on research that investigated how four experienced teacher educators restructured and reinterpreted their pedagogies when teaching with mobile technologies. We used self-study to uncover our subjectivities in relation to performing as teachers, by sharing through creative writing, peer observations, and journals, our experiences of integrating mobile technologies into our teaching. Over a year, across different programmes and curricular areas, we used mobile technologies for assessment and feedback. Self-study allowed us to examine shared feelings of frustration with logistics, infrastructure, and workload and of vulnerability and inadequacy with handling the technology. We found minimal obstacles to generating feedback with technologies, but were challenged with discerning and acting on this feedback. We concluded that teaching in the 21st century will almost definitely become increasingly dependent on technology yet expert teachers will always be defined by their expertise in the teaching role rather than technical prowess.
Monday 28 April
3:30pm Working Group Poster Presentations Session 3

Innovations in Online Postgraduate Curriculum Design for Internationalisation
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This research study is based on a concept design for developing a postgraduate curriculum which will cater to the needs of the students in the region as well as have the scope for its internationalisation. Among many existing challenges of providing quality education online, e.g., lack of online learning protocols and rules of engagement. This study provides a critical analysis and solutions for a number of issues such as e-assessment, interactivity, and group work in an online environment.

An Evaluative Study of the Use of e-Portfolios within a Graduate Teacher Education Qualification in New Zealand
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The use of e-Portfolios is central within the redesigned one-year Graduate Primary Teacher Education qualification being delivered at the University of Canterbury for the first time in 2014. As the use of e-portfolios has significantly increased across multiple courses in this new qualification, opportunities and challenges have emerged in relation to their use by a wide range of academic staff (as new/key components of their courses) and students (who are increasingly using them in more complex ways and for a range of different purposes). This increase in complexity and usage has highlighted the need to evaluate the use and impact of the e-Portfolio by staff and students in a timely and on-going manner. It is intended that the findings of this study will inform existing and new developments in the use of e-Portfolio by staff and students within Teacher Education and Higher Education contexts.

Self-Regulated Learning Strategies for Pre-Service Mathematics Teachers Using Technology for Teaching Mathematics
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Given the rapid advances in information today, knowledge will need to be regularly updated; teaching methods and skills will need to be revisited. The IT knowledge and skills needed by students in order to participate in society changes as technology changes; and technology changes rapidly. Preparing Pre-service mathematics teacher (PSMTs) to be fluent with technology will enable them to become adaptive to technological change, which is necessary to integrate technology into their pedagogy.

The Digital Dilemma
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The 'digital dilemma' is a situation that pre service teacher education providers need to consider if pre-service teachers are going to be able to confidently embrace the pedagogical shift occurring due to the rapid change in and influence of digital technology on education. This poster examines how an unintended outcome from a research project into the effect of iPad Mini use as a practicum tool, has led to in progress research on how pre service teacher institutions can take the lead in supporting the digital empowerment rather than contributing to the potential digital disengagement of their graduates.
Getting the Mix Right: Avoiding Anachronistic Pedagogy in Teacher Education
Nigel V. Smith
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Inspiring trainee teachers towards future focussed pedagogy requires that our own pedagogy as teacher educators model good use of technology. This sometimes requires courage. This poster will present two examples of courageous pedagogy. The first involved embracing new pedagogy in an effort to model a 1:1 device-based classroom. The second involved using printed readings instead of the customary provision of online readings only. Both examples were warmly received by students and commented on positively in course evaluations. The poster will explore how these courageous choices were implemented, why the resultant learning was rich, and how the research literature can inform our practice in making decisions about selecting well from the pedagogical options available to us as teacher educators.

Getting More for Less: The Use of Feedforward Using Video in Initial Teacher Education
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Hattie places feedback as one of the top four areas to make a difference in teaching and learning. Feedback to be effective needs to be specific to the task, informative and also providing information to help the learner make changes for the better. Feedforward is a concept has been around since the 1970s, it was first coined in the mid-1970s by Dowrick in relation to the behavioural sciences and self model. In exploring 21st-century technologies and how they might be leveraged we need to be cognisant of the fundamentals of learning and use video in a targeted and meaningful way to maximize time and learning opportunities. This poster proposes the use of short videos to convey content, self made feedforward videos to increase self efficacy and promote rapid learning to acquire the skills of teacher behaviour.

Using Tablet Technology for Assessment
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As tablet technology becomes more readily available in schools and teachers integrate tablet technology into their teaching and learning programmes, the possibilities for using this technology in other aspects of teachers’ classroom practices can be explored. One such aspect is assessment of students’ understanding of concepts and application of strategies taught. Through the use of applications (apps) such as Educreations, Show Me or Explain Everything, students are able to make notes while recording their voice as they work on a task. This presentation expands on the reported findings of a small pilot project, carried out in three primary schools in Dunedin, New Zealand, using tablet technology for assessment in mathematics. The aim of the research was to investigate whether using an application (app) that allowed the user to make notes and record sound in real time enabled the teacher to gather more detailed evidence about the students’ thinking process and the strategies they used during assessment tasks in mathematics. Also presented are the considerations that need to be taken into account when using tablet technology in this way and how this more detailed assessment data can be used for moderation and reporting purposes.

Tuesday 29 April
10:30am Working Group Presentations Session 4

Personalizing Educational Content Delivery – Giving the Learner What They Need When They Need It
Karen Allnutt-Steelman
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Teacher education can draw on the experience of the health education sector in personalizing course content for online delivery of specialization topics. For some educational topics, the sequence of course content is arbitrary rather than linear. This online team-taught graduate-level nursing health assessment course is one of those courses. The instructors wanted to reduce student confusion and frustration by providing course materials relevant to a student's specialty area and synchronized to their individual laboratory schedule. A content map was developed that identified the discreet information associated with each specialty area. Then the course material was restructured into topic specific chunks of information. When content presentation is arbitrary, it is possible to use technology to design a course that meets the needs of the learner. This method works well for specialized education topics that include laboratory practice.
Evolving Resilience Through e-Learning: An Emerging Case Study of Change in Initial Teacher Education Programmes as a Result of Seismic Events
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Change can be viewed as an evolutionary process in which the educators and their organisations are co-evolving with digital technologies (Davis, Eickelmann, & Zaka, 2013) and sometimes the co-evolution is stimulated by a shock that speeds changes in behaviour of the organisation as well as its staff and students. This paper presents the emerging findings in a case study of one College of Education that was impacted by seismic events in New Zealand. Documentary analysis and an interview of two staff indicate that evolution was prompted and has been sustained to enable the College to become more resilient. For example, with the adoption of a lecture capture system and also a move away from physical of assignments mailed to the college into online assessment managed through the LMS. This evolutionary process will be later evaluated though the generic model of organisational resilience by Resilient Organisations (2012).

Pre-service Teachers: What do They Know about Cyberlaw?
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This paper presents preliminary findings from an exploratory multi-method study into pre-service teachers’ perspectives regarding legal and ethical issues relevant to the use of ICT in schools. It identifies requirements for legal literacy that not only support legally compliant behaviour, but which can also support the development of active citizenship in students and highlights areas of factual legal knowledge which may require more attention in pre-service education.

Tuesday 29 April
11:30am Working Group Presentations Session 5

An Essential and Engaging On-Line Environment for Learning – Making it Meaningful Our Journey
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This paper examines the experiences of two lecturers in an early childhood initial teacher education programme, as they navigated and adapted Adobe Connect technology to build reciprocal and responsive relationships with their online students. As noted it is important that early childhood teachers are able to build and maintain relationships which foster children’s learning and development (Ministry of Education, 1996). The lecturers questioned how they could model building reciprocal and responsive relationships with their online students so that the student’s experiences and learning were enhanced. The findings indicated that students were eager and willing to participate via this technology, had a sense of belonging, engaged with content and built relationships with lecturers and colleagues. Future considerations are noted and include the need for professional development of staff to learn more about the key features of Adobe Connect to facilitate student-led sessions. Exploring the relationship between students’ engagement with course content and how this can be reflected in their professional practices is considered.

Language Teacher Education in a Digital World
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This paper outlines what would be required of an initial teacher education programme for secondary language teachers that prepares its graduates to a) meet the demands and affordances of the learning environments they are being prepared for; b) use the technology available to enhance their students’ language learning; c) flexibly respond to and initiate future developments of technology and language pedagogy and d) participate in online sharing and building upon materials, insights and strategies with other language educators.
Preparing New Teachers for Digitally-Enabled, Future-Focussed Learning Environments

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New teachers are launching their careers in learning environments that are constantly evolving and a step change to what they themselves experienced as learners. These changes are powered by changing learning space architectures, the ubiquity of digital technologies, a growing emphasis on networked communities and professional learning networks, an understanding of learner agency and significant shifts in the de-privatization of teacher practice. As they incorporate these changes schools are becoming increasingly innovative resulting in wide variation in what classrooms and teaching and learning look like in practice. The complex changes, in many cases, are underpinned by transformative shifts in school culture, the expectations for students to manage their learning more independently, and a more inclusive and genuine effort to engage with students, whānau and teachers in the collaborative development of meaningful learning experiences to improve student outcomes. This presentation will consider the implications for initial teacher education, while also drawing upon our research into the leadership strategies that we are researching in collaboration with principals who are transforming their schools accompanied by increased ICT integration.
Pre-service Teachers’ TPACK Confidence in a Regional Australian University

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Abstract: The extent of transformation of education by integration of ICT appears not to match that in other sectors. More effective preparation of teachers is widely assumed to be part of any solution, leading to interest in what knowledge, skills and dispositions are required of teachers and how best to develop those. The Australian Teaching Teachers for the Future (TTF) project appears to have demonstrated some success in enhancing pre-service teachers’ TPACK confidence. This paper presents data from a regional Australian university where the change appears to have preceded implementation of TTF and considers factors that may have contributed to that change.

Introduction

The widespread adoption of Information and Communication Technology (ICT) has transformed many aspects of life, including economic and social activity, in developed countries and is affecting the path of development in all parts of the world. However, expectations that education should be transformed by ICT have seldom been realised to the anticipated extent, despite considerable ongoing investments in hardware, software and preparation of teachers. Research into the factors that influence teachers’ use of ICT to support learning and teaching is informing ongoing development of teacher preparation programs. This paper examines the experience of teacher preparation in one regional university in Australia against the context of a significant national initiative for advancing the application of ICT in education.

When the Australian Labour Party was elected to national government in late 2007 it included in its platform a policy described as the Digital Education Revolution (DER), intended to achieve a national vision for ICT in education (DEEWR 2008). The vision called for all students to graduate with relevant knowledge and skills for using ICT and for learning to be enhanced by integration of ICT. That was consistent with what had been agreed nationally at the turn of the century but had been left to the states and territories for separate implementation. Following the election the relevant state and federal ministers agreed that “Australia will have technology enriched learning environments that enable students to achieve high quality learning outcomes and productively contribute to our society and economy” (MCEECDYA 2008, p. 1).

As is often the case with ICT in education there was a focus on tangible outcomes such as hardware and one of the most visible elements of the DER was funding to increase the provision of computers in schools to a ratio of 1:1 for years 9 to 12 by 2011. However, despite the initial thrust of the DER toward provision of equipment, the implementation roadmap recognized that “educators require the pedagogical knowledge, confidence, skills, resources and support to creatively and effectively use online tools and systems to engage students” (AICTEC 2009, p. 6). The document noted the importance of providing “professional learning opportunities for existing teachers to upgrade or develop proficiency in the effective and innovative/creative educational use of ICT” and ensuring “that the national graduate teacher standards include rigorous requirements regarding the use of technology in teaching” (AICTEC 2009, p. 8).

The importance of preparing teachers to work effectively with ICT was not a new insight. There is widespread acknowledgement that teacher quality is the most important factor in quality learning for students and a report commissioned by the OECD noted that “the quality of an education system cannot exceed the quality of its teachers” (Barber & Mourshed 2007, p. 7). Australian programs for teacher preparation and development have addressed ICT integration for more than 20 years and have, at times, benefited from targeted government support. However, what was proposed in this instance was a concerted national effort with substantial funding in support.
Teacher preparation for working with ICT

Researchers seeking to enhance integration of ICT for learning through better understanding of factors that facilitate or inhibit teachers’ uptake of ICT have identified both external, institutional factors such as access to ICT and supportive administration, and internal, personal characteristics as important (Ertmer 1999). Teacher beliefs, especially a sense of efficacy or confidence in being able to perform the behaviors necessary for success, have long been identified as influencing teacher integration of ICT for learning (Albion & Ertmer 2002; Ertmer 2005; Ertmer & Ottenbreit-Leftwich 2010). More recent work has argued that teachers’ own experiences of learning in school and teacher preparation programs set the pattern for how they behave in their own classrooms (Belland 2009).

However, despite the research and associated efforts to better prepare teachers for working with ICT, computers in schools are still seen by some as “oversold and underused” (Cuban 2001). Moreover, teaching with ICT has been described as a “wicked problem” (Mishra & Koehler 2007), one that is complex and ill-structured, with constantly changing context and problem definition, and little or no agreement among experts about solutions. ICT skills and positive attitudes are necessary but not sufficient conditions for teachers to solve such problems.

The knowledge required for teaching is multi-dimensional. Shulman (1986) proposed that, in addition to content knowledge (CK) and pedagogical knowledge (PK), teachers required Pedagogical Content Knowledge (PCK), a blend of knowledge that enables teachers to make strategic decisions about how to represent content for effective learning in a given context. Although Shulman did not represent PCK diagrammatically it has conventionally been shown as a Venn diagram with PCK in the intersection of two circles representing CK and PK. Mishra and Koehler (2006) argued that technology (ICT) has changed the classroom sufficiently that the concept of PCK should be extended to include technological knowledge (TK). They extended the Venn diagram widely used to represent PCK to include TK and additional intersections as shown in Figure 1. The most complex knowledge, the region giving rise to “wicked problems”, is where all three circles intersect representing Technological Pedagogical Content Knowledge (TPCK). An “A” was subsequently added to make the acronym pronounceable (Thompson & Mishra 2007, p. 38). TPACK is the knowledge likely to be required of teachers working with ICT and hence should be a focus of teacher preparation.

![Technological Pedagogical Content Knowledge (TPACK)](image)

**Figure 1:** Technological Pedagogical Content Knowledge (TPACK) [after Mishra and Koehler (2006)]

Teaching Teachers for the Future

Strategies for achieving the goals of the Australian Government’s DER included an ICT Innovation Fund (DEEWR 2010) for which the successful bid for addressing pre-service teacher education was led by a group acting for the Australian Council of Deans of Education and representing all 39 Australian teacher preparation providers. The *Teaching Teachers for the Future* (TTF) project comprised three components, namely, extending the Australian...
Institute for Teaching and School Leadership (aitsl.edu.au) graduate teacher standards to include ICT dimensions, developing professional learning packages demonstrating ICT integration in the Australian curriculum (ttf.edu.au), and developing a National Support Network (NSN) to facilitate treatment of ICT in teacher education. The third component funded a full-time person with experience in K-12 classroom integration of ICT and a half-time project manager in each institution for a year of project implementation.

During preparation of the TTF proposal TPACK was identified as a useful conceptualization of pre-service teachers’ capabilities for ICT integration. It was adopted as the underlying framework for the TTF project and informed the development of the professional learning packages and the work of the NSN. As a consequence, one aspect of evaluation of the TTF project was focused on changes in pre-service teachers’ TPACK. That part of the project was planned and managed by a Research and Evaluation Working Group (REWG) with representation from multiple institutions. The TTF project involved 39 institutions and several thousand pre-service teachers. Tracking changes in TPACK presented logistical challenges and required a valid and reliable instrument capable of being administered online to large numbers of respondents.

Measuring TPACK

Abbitt (2011) located 33 studies that assessed TPACK, including 20 that had been conducted in pre-service teacher programs. Another review found 141 instruments measuring some aspect of TPACK (Koehler, Shin, & Mishra 2011). However, despite this abundance of TPACK-related instruments, there is not yet a widely accepted instrument for measuring TPACK.

A direct measure of teachers’ TPACK would be desirable but performance-based measures are impractical for large numbers and self-report measures of capabilities are also problematic (Graham, Cox, & Velasquez 2009). Research has demonstrated that teachers’ behaviors are influenced by related levels of confidence (Ertmer & Ottenbreit-Leftwich 2010) that can be reliably assessed using self-report measures. There is reason to expect that teachers with greater confidence for performing TPACK-related behaviors would be more likely to perform such behaviors in their classrooms, making a measure of TPACK confidence potentially useful as an indicator of progress in teacher preparation. TPACK confidence of pre-service teachers at two Australian universities had been audited previously using a TPACK Confidence Survey (TCS) (Albion, Jamieson-Proctor, & Finger 2010). Analysis found two factors representing respectively enhancing and transforming learning outcomes with alpha reliabilities of 0.94 and 0.86.

The TCS was used as the starting point for development of an instrument for use in the TTF project (Jamieson-Proctor et al. 2013). Members of the working group undertook additional analysis of the TCS data using Rasch modeling to confirm the characteristics of existing items and generated additional items for all aspects of the TPACK framework. The final instrument comprised 48 statements describing behaviors with ICT in Education and respondents were invited to indicate confidence for performing, and anticipated usefulness of, the behavior using a 7-point scale for each. Half of the items focused on the use of ICT to support teaching (representing TPK and TCK) and the remainder addressed the use of ICT to support student learning (representing the more tightly integrated knowledge characteristic of TPCK). Table 1 displays typical items from the major scales.

| Technological Pedagogical Knowledge (TPK) |  |
| How confident are you that you have the knowledge, skills and abilities to use ICT to … |  |
| Demonstrate knowledge of the range of ICT to engage students |  |
| Access, record, manage, and analyze student assessment data |  |

| Technological Content Knowledge (TCK) |  |
| How confident are you that you have the knowledge, skills and abilities to … |  |
| Design learning sequences, lesson plans and assessment that use ICT to develop students’ Mathematics knowledge, attitudes and skills |  |
| Implement meaningful use of ICT by students in achieving Mathematics curriculum goals |  |

| ICT integration – TPCK |  |
| How confident are you that you have the knowledge, skills and abilities to support students’ use of ICT to … |  |
| Demonstrate what they have learned |  |
| Integrate different media to create appropriate products |  |

Table 1: Sample items from the core groups in the instrument
The questionnaire was administered online using Qualtrics twice, in May-July (T1, N=12881) and October-November 2011 (T2, N=5809), and data were examined using both factor analysis and Rasch modeling with results confirming acceptable factor structure and measurement properties (Jamieson-Proctor et al. 2013).

**Measuring TPACK Outcomes for the TTF project**

**National results**

Responses from the national samples at T1 and T2 were compared using nonparametric (Kruskal-Wallis) tests to determine statistical significance of differences with the threshold probability set at $p < .002$ (Finger et al. 2013). Responses at T2 were significantly more positive for all 24 items for confidence related to using ICT to support teaching and for all 24 items for confidence related to using ICT to support student learning. There were no significant differences between T1 and T2 measures for any of the items measuring expected usefulness of ICT for the same behaviors in support of teaching or student learning. The lowest means recorded for usefulness on both sets of items were greater than the highest means recorded for confidence, suggesting that there may be a 'ceiling effect' allowing insufficient scope for pre-service teachers to register any increase in perceived usefulness of ICT from T1 to T2. In general pre-service teachers appear to have high expectations of the usefulness of ICT for supporting teaching and student learning. The interventions supported by the TTF project appear to have resulted in a significant increase in their confidence in their abilities to perform the relevant behaviors in their classrooms.

**Institutional results**

The national project provided each participating institution with summaries (as frequency tables) of the full national dataset and the dataset for respondents from the individual institution. Availability of these data enabled calculation of means and standard deviations permitting comparison of data from the regional university with the national data. Table 2 presents results from the national dataset and for the regional university collected at T1. Means were calculated for confidence and usefulness on the groups of items identified as representing TPACK elements. The analysis was conducted on raw data prior to the national analysis described above but it subsequently confirmed the validity of the questionnaires. The means obtained for the regional university at T1 were significantly higher than the national means (Z-test, $p < .01$) for five of the six composite measures. Analysis of T2 data did not reveal any significant differences, suggesting that if there had been an increase in scores for the regional university relative to the national results that had occurred prior to or in the initial phase of the TTF.

<table>
<thead>
<tr>
<th>Item group</th>
<th>National N</th>
<th>Mean</th>
<th>SD</th>
<th>University N</th>
<th>Mean</th>
<th>SD</th>
<th>Z</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confidence</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPK</td>
<td>9422</td>
<td>4.01</td>
<td>1.40</td>
<td>508</td>
<td>4.24</td>
<td>1.34</td>
<td>3.72</td>
<td>&lt;.001 *</td>
</tr>
<tr>
<td>TCK</td>
<td>6304</td>
<td>3.81</td>
<td>1.45</td>
<td>390</td>
<td>4.01</td>
<td>1.38</td>
<td>2.70</td>
<td>.003 *</td>
</tr>
<tr>
<td>TPPK</td>
<td>8816</td>
<td>3.99</td>
<td>1.38</td>
<td>486</td>
<td>4.13</td>
<td>1.32</td>
<td>2.41</td>
<td>.008 *</td>
</tr>
<tr>
<td>Usefulness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPK</td>
<td>9416</td>
<td>5.15</td>
<td>1.11</td>
<td>508</td>
<td>5.29</td>
<td>1.00</td>
<td>3.04</td>
<td>.001 *</td>
</tr>
<tr>
<td>TCK</td>
<td>6218</td>
<td>5.26</td>
<td>1.06</td>
<td>390</td>
<td>5.32</td>
<td>1.02</td>
<td>1.07</td>
<td>.142</td>
</tr>
<tr>
<td>TPCK</td>
<td>8809</td>
<td>5.11</td>
<td>1.11</td>
<td>485</td>
<td>5.23</td>
<td>1.02</td>
<td>2.45</td>
<td>.007 *</td>
</tr>
</tbody>
</table>

Table 2: Mean scores on subscales for national and university datasets (* = significant at 1%)

Students of the regional university had participated in previous studies that included 20 items from the TCS that were included in the TTF instrument (Albion et al. 2010). Thus it was possible to examine longer term trends in responses to those items by comparing data from 2009 and 2010 administrations with data from T1 and T2 collections in the TTF project. Table 3 presents results for those 20 common items from the T1 datasets for the national pool and the regional university together with Z values and probability estimates. Although, as shown in Table 2, the regional university mean on the TPCK subscale is significantly higher than the national mean ($Z = 2.41$, $p = .008$), the means on just 9 of the 20 items are significantly higher ($p < .01$).
How confident are you that you have the knowledge, skills and abilities to support students’ use of ICT to …

<table>
<thead>
<tr>
<th>Item</th>
<th>National (N = 8816)</th>
<th>University (N = 486)</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
<th>Z</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. provide motivation for curriculum tasks</td>
<td>4.12</td>
<td>1.32</td>
<td></td>
<td>4.23</td>
<td>1.25</td>
<td></td>
<td>1.98</td>
<td>.024</td>
</tr>
<tr>
<td>2. develop functional competencies in a specified curriculum area</td>
<td>3.82</td>
<td>1.35</td>
<td></td>
<td>3.99</td>
<td>1.31</td>
<td></td>
<td>2.84</td>
<td>.002</td>
</tr>
<tr>
<td>3. actively construct knowledge that integrates curriculum areas</td>
<td>3.93</td>
<td>1.35</td>
<td></td>
<td>4.07</td>
<td>1.32</td>
<td></td>
<td>2.31</td>
<td>.011</td>
</tr>
<tr>
<td>4. actively construct their own knowledge in collaboration with their peers and others</td>
<td>3.99</td>
<td>1.34</td>
<td></td>
<td>4.07</td>
<td>1.28</td>
<td></td>
<td>1.36</td>
<td>.087</td>
</tr>
<tr>
<td>5. synthesise their knowledge</td>
<td>3.80</td>
<td>1.39</td>
<td></td>
<td>3.93</td>
<td>1.32</td>
<td></td>
<td>2.14</td>
<td>.016</td>
</tr>
<tr>
<td>6. demonstrate what they have learned</td>
<td>4.18</td>
<td>1.34</td>
<td></td>
<td>4.31</td>
<td>1.28</td>
<td></td>
<td>2.22</td>
<td>.013</td>
</tr>
<tr>
<td>7. acquire the knowledge, skills, abilities and attitudes to deal with on-going technological change</td>
<td>4.09</td>
<td>1.41</td>
<td></td>
<td>4.24</td>
<td>1.35</td>
<td></td>
<td>2.29</td>
<td>.011</td>
</tr>
<tr>
<td>8. integrate different media to create appropriate products</td>
<td>3.87</td>
<td>1.43</td>
<td></td>
<td>4.00</td>
<td>1.38</td>
<td></td>
<td>2.04</td>
<td>.021</td>
</tr>
<tr>
<td>9. develop deep understanding about a topic of interest relevant to the curriculum area/s being studied</td>
<td>4.07</td>
<td>1.32</td>
<td></td>
<td>4.17</td>
<td>1.30</td>
<td></td>
<td>1.70</td>
<td>.045</td>
</tr>
<tr>
<td>10. support elements of the learning process</td>
<td>4.05</td>
<td>1.32</td>
<td></td>
<td>4.20</td>
<td>1.27</td>
<td></td>
<td>2.57</td>
<td>.005</td>
</tr>
<tr>
<td>11. develop understanding of the world</td>
<td>4.23</td>
<td>1.31</td>
<td></td>
<td>4.36</td>
<td>1.22</td>
<td></td>
<td>2.28</td>
<td>.011</td>
</tr>
<tr>
<td>12. plan and/or manage curriculum projects</td>
<td>4.03</td>
<td>1.37</td>
<td></td>
<td>4.20</td>
<td>1.32</td>
<td></td>
<td>2.74</td>
<td>.003</td>
</tr>
<tr>
<td>13. engage in sustained involvement with curriculum activities</td>
<td>3.98</td>
<td>1.36</td>
<td></td>
<td>4.17</td>
<td>1.33</td>
<td></td>
<td>3.04</td>
<td>.001</td>
</tr>
<tr>
<td>14. undertake formative and/or summative assessment</td>
<td>3.97</td>
<td>1.42</td>
<td></td>
<td>4.16</td>
<td>1.37</td>
<td></td>
<td>2.87</td>
<td>.002</td>
</tr>
<tr>
<td>15. engage in independent learning through access to education at a time, place and pace of their own choosing</td>
<td>4.06</td>
<td>1.41</td>
<td></td>
<td>4.26</td>
<td>1.36</td>
<td></td>
<td>3.06</td>
<td>.001</td>
</tr>
<tr>
<td>16. gain intercultural understanding</td>
<td>3.87</td>
<td>1.37</td>
<td></td>
<td>4.03</td>
<td>1.32</td>
<td></td>
<td>2.42</td>
<td>.008</td>
</tr>
<tr>
<td>17. acquire awareness of the global implications of ICT-based technologies on society</td>
<td>3.81</td>
<td>1.40</td>
<td></td>
<td>3.93</td>
<td>1.34</td>
<td></td>
<td>1.84</td>
<td>.033</td>
</tr>
<tr>
<td>18. communicate with others locally and globally</td>
<td>4.34</td>
<td>1.38</td>
<td></td>
<td>4.50</td>
<td>1.27</td>
<td></td>
<td>2.62</td>
<td>.004</td>
</tr>
<tr>
<td>19. understand and participate in the changing knowledge economy</td>
<td>3.79</td>
<td>1.45</td>
<td></td>
<td>4.05</td>
<td>1.35</td>
<td></td>
<td>4.09</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>20. critically evaluate their own and society’s values</td>
<td>3.90</td>
<td>1.39</td>
<td></td>
<td>4.01</td>
<td>1.33</td>
<td></td>
<td>1.68</td>
<td>.046</td>
</tr>
</tbody>
</table>

Table 3: National and regional university T1 results for selected TPCK subscale items (* = significant at 1%)

The 2009 and 2010 questionnaires used a 4-point scale scored from 1 to 4 with anchors of ‘No confidence’, ‘Some confidence’, ‘Confident’, and ‘Very confident’ but, as described above, the TTF questionnaire used a 7-point scale, necessitating conversion. Table 4 aligns the 4-point and 7-point scales to show how the 2011 data were converted to the 4-point scale.

Table 4: Conversion of 7-point scale to 4-point scale for comparison

Table 5 compares results for the 20 common questions across administrations at the regional university in 2009, 2010 and T1 and T2 in 2011. Average scores are included at the end of the table and Z scores and P values are presented for the 2009 to T2 (2011) comparisons. There were no significant differences between scores recorded in 2009 and 2010 or between T1 and T2. Scores on all items were significantly higher (p < 0.01) for either T1 or T2 in 2011 than in 2009 or 2010.
for systematic change of teacher preparation programs generated by the TTF can be maintained there is reason to
institutions to have a positive eff
elsewhere (Finger et al.
The elapsed time between the T1 and T2 data collections in 2011 was short but the evidence presented here and elsewhere (Finger et al. 2013) suggests that it may have been sufficient for the actions initiated in the participating institutions to have a positive effect on the TPACK confidence of pre-service teachers. Provided that the momentum for systematic change of teacher preparation programs generated by the TTF can be maintained there is reason to

| Table 5: Trends in regional university scores for common TPCK items across 2009-2011 (* = significant at 1%) |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| How confident are you that you have the knowledge, skills and abilities to support students’ use of ICT to … | 2009 | 2010 | 2011 T! | 2011 T2 | 2011 T2-2009 |
| | M | SD | M | SD | M | SD | M | SD | Z | P |
| 1 | provide motivation for curriculum tasks | 2.94 | .70 | 2.93 | .73 | 3.11 | .62 | 3.15 | .66 | 2.92 | .002 * |
| 2 | develop functional competencies in a specified curriculum area | 2.76 | .75 | 2.76 | .75 | 3.00 | .66 | 3.04 | .68 | 3.71 | <.001 * |
| 3 | actively construct knowledge that integrates curriculum areas | 2.86 | .74 | 2.79 | .76 | 3.03 | .66 | 3.08 | .67 | 3.00 | .001 * |
| 4 | actively construct their own knowledge in collaboration with their peers and others | 2.88 | .69 | 2.86 | .75 | 3.04 | .64 | 3.10 | .66 | 3.17 | .001 * |
| 5 | synthesise their knowledge | 2.86 | .73 | 2.78 | .74 | 2.96 | .66 | 3.04 | .69 | 2.39 | .008 * |
| 6 | demonstrate what they have learned | 3.04 | .66 | 2.94 | .74 | 3.15 | .64 | 3.17 | .69 | 1.92 | .028 * |
| 7 | acquire the knowledge, skills, abilities and attitudes to deal with on-going technological change | 2.72 | .77 | 2.76 | .79 | 3.12 | .67 | 3.13 | .69 | 5.33 | <.001 * |
| 8 | integrate different media to create appropriate products | 2.63 | .87 | 2.71 | .83 | 3.00 | .69 | 3.02 | .73 | 4.51 | <.001 * |
| 9 | develop deep understanding about a topic of interest relevant to the curriculum area/s being studied | 2.90 | .76 | 2.86 | .75 | 3.09 | .65 | 3.10 | .69 | 2.56 | .005 * |
| 10 | support elements of the learning process | 2.93 | .69 | 2.90 | .72 | 3.10 | .63 | 3.11 | .65 | 2.59 | .005 * |
| 11 | develop understanding of the world | 2.75 | .75 | 2.74 | .78 | 3.18 | .61 | 3.17 | .65 | 5.57 | <.001 * |
| 12 | plan and/or manage curriculum projects | 2.88 | .72 | 2.82 | .76 | 3.10 | .66 | 3.08 | .69 | 2.76 | .003 * |
| 13 | engage in sustained involvement with curriculum activities | 2.81 | .74 | 2.79 | .76 | 3.08 | .66 | 3.08 | .68 | 3.58 | <.001 * |
| 14 | undertake formative and/or summative assessment | 2.96 | .71 | 2.91 | .8 | 3.08 | .69 | 3.11 | .69 | 2.01 | .022 |
| 15 | engage in independent learning through access to education at a time, place and pace of their own choosing | 2.87 | .76 | 2.82 | .75 | 3.13 | .68 | 3.10 | .68 | 3.07 | .001 * |
| 16 | gain intercultural understanding | 2.81 | .77 | 2.81 | .76 | 3.01 | .66 | 3.04 | .67 | 3.04 | .001 * |
| 17 | acquire awareness of the global implications of ICT-based technologies on society | 2.60 | .82 | 2.61 | .80 | 2.97 | .67 | 2.98 | .69 | 4.75 | <.001 * |
| 18 | communicate with others locally and globally | 3.09 | .73 | 3.02 | .74 | 3.25 | .64 | 3.24 | .69 | 2.00 | .023 |
| 19 | understand and participate in the changing knowledge economy | 2.66 | .76 | 2.66 | .79 | 3.03 | .67 | 2.98 | .69 | 4.19 | <.001 * |
| 20 | critically evaluate their own and society’s values | 2.75 | .74 | 2.76 | .77 | 3.01 | .67 | 3.01 | .69 | 3.42 | <.001 * |
| Mean score | 2.84 | .74 | 2.81 | .76 | 3.07 | .66 | 3.09 | .68 | 3.36 | <.001 * |

Discussion

The elapsed time between the T1 and T2 data collections in 2011 was short but the evidence presented here and elsewhere (Finger et al. 2013) suggests that it may have been sufficient for the actions initiated in the participating institutions to have a positive effect on the TPACK confidence of pre-service teachers. Provided that the momentum for systematic change of teacher preparation programs generated by the TTF can be maintained there is reason to

15 SITE International Symposium: Future Focussed Teacher Education 28-29 April 2014
University of Canterbury, Christchurch, New Zealand
hope that the short but intense intervention of the TTF may have initiated lasting change in teacher preparation with benefits flowing to the enhanced integration of ICT in K-12 classrooms.

For the regional university at which this study was conducted, an unexpected aspect of the data was that the scores at T1 were significantly higher than the national means. By T2 there was no significant difference, suggesting that gains, equivalent to those experienced nationally between T1 and T2, had occurred earlier at the regional university. This observation prompts questions about why TPACK confidence scores at the regional university might have been higher than the national mean at T1.

Table 5 presented data for final year students in 2009 and for students across all years in 2010 and 2011. Although there was no significant increase from 2009 to 2010 there were significant increases on all items from 2010 to 2011 T1. Examination of data for final year students reveals that there are 6 items with significant (p < .01) increases from 2009 to 2010 and 2 with significant increases from 2010 to 2011 T1. However, all 20 items show significant increases (p < .01) from 2009 to 2011 T1. The implication is that the mean TPACK confidence of students at the regional university has increased from 2009 to 2011 T1 and then plateaued.

In considering potential reasons for these results, two possible explanations emerge. The first is associated with the introduction from 2010 of an ICT and Pedagogy course, as a requirement for all students in the Bachelor of Education (BEd) programs. The second is the transition, beginning in 2009, to offering all courses in the BEd online.

For the decade prior to 2000 the BEd programs had included a required course intended to develop computer skills but without a specific focus on the integration of ICT in learning and teaching. A program redesign in 2000 replaced that required course with one intended to develop computer skills with a clear focus on their application for learning and teaching. A subsequent program revision in 2003 removed the required ICT course with the expectation that the ‘digital natives’ then entering the program had the necessary ICT skills and that educational applications would be integrated across all courses in the program. By 2007 there was ample evidence that the integrated approach was not as successful as had been expected by the program designers. A further program revision reintroduced an ICT and Pedagogy course required for all BEd students and taken by most in the third year of their four year program. Final year students responding to the 2011 questionnaire had completed that course. It seems likely that at least some of the increase in TPACK confidence between 2009, when respondents had not taken that course, and 2011, when they had, should be attributable to the contribution of that course, which specifically addressed many of the aspects polled in the TCS. The evidence suggests that the inclusion of the required ICT and Pedagogy course was justified and that the course should be maintained.

The program revision initiated in 2007 included a decision that all BEd courses should be available online as well as being taught face-to-face on each of the three campuses where the program is offered. Offering courses online was intended to open access to the program for students who lived distant from the university and whose life circumstances prevented them from moving to a campus for study. It also offered flexibility for students who were studying on a campus when the number requiring a course on their campus was too small to sustain a class or they were unable to attend class for some other reason. Within a year of online offers being initiated, up to 70% of students in any course were studying online and most students were taking at least some courses online. The online offering has affected the way that courses are developed and taught such that all students in a course, even those enrolled on a campus, will interact with at least parts of the online course materials. In doing so they experience learning with ICT in ways that they might not have done in conventionally offered courses and that experience is likely to affect their knowledge of learning and teaching with ICT and their confidence for working with ICT. At the same time, course staff who had to engage with ICT as courses went online have become more confident in their use of ICT to support learning and teaching and more likely to integrate ICT in their face-to-face classes as well as when working online. In doing so they necessarily model the continuous professional learning that will be needed by the graduates they are preparing. The combination of working more extensively with ICT for their own learning, seeing its use modeled more frequently in teaching, and observing the continuing professional learning of more senior educators will have contributed to the increased scores of pre-service teachers on the TPACK confidence scales.

 Probably the key lesson for teacher preparation from these data is the importance of programs ‘practising what they preach’ by modeling the use of ICT to support learning and teaching in ways similar to those being promoted for classroom use. ICT continues to develop rapidly and regardless of how rich an experience of learning with ICT pre-
service teachers have had in their own education they will be expected to return to schools prepared to make effective use of a new generation of ICT. The challenge for relatively short programs of teacher preparation to change expectations developed through twelve years of prior educational experience (Belland, 2009) continues but the data presented here suggest that progress can be made when teacher educators are challenged and supported to engage with new ICT in their work. In that way pre-service teachers can both experience new ICT for their own learning and see modeled the process of continuous professional learning and program renewal.

References


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Personalizing Educational Content Delivery – Giving the Learner What They Need When They Need It

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Abstract: Teacher education can draw on the experience of the health education sector in personalizing course content for online delivery of specialization topics. For some educational topics, the sequence of course content is arbitrary rather than linear. This online team-taught graduate-level nursing health assessment course is one of those courses. The instructors wanted to reduce student confusion and frustration by providing course materials relevant to a student’s specialty area and synchronized to their individual laboratory schedule. A content map was developed that identified the discreet information associated with each specialty area. Then the course material was restructured into topic specific chunks of information.

When content presentation is arbitrary, it is possible to use technology to design a course that meets the needs of the learner. This method works well for specialized education topics that include laboratory practice.

Introduction

Most education delivery is linear in nature because it is convenient for the instructor; because a lot of content builds in complexity throughout the semester or term; because it is easier to shepherd a group of students together rather than accommodating their individual differences; because it is an accepted method of doing standardized education; and because it is the way that instructors themselves learned the material. Educators are aware that this practice often fails students and sometimes instructors. It is difficult to escape this pattern because of time, resources, or knowledge of how to effect the necessary changes.

Instructional designers are often presented with design challenges by instructors of things that they know or want to improve, but lack ideas on how to proceed. In this particular situation, three nursing professors that team-teach an online graduate level Health Promotion Assessment course wanted to know if it was possible to customize the content presentation based upon an individual student’s specialty area (there are six) and then sequence the content review and presentation (there are nineteen modules) in the order that students self-registered for content related laboratories (there are twenty-three) to fit their personal schedules. Some modules have more than one laboratory sessions associated with them.

The Health Promotion Assessment course emphasizes the knowledge and skills necessary for advanced health assessment and health promotion of individuals and families across the lifespan. The course focuses on the advanced assessment of the physical, psychological, genetic, socio-cultural, spiritual, environmental, and developmental elements necessary for refining an individual nurse’s diagnostic and clinical decision making skills. Communication and interviewing techniques are presented and practiced. The course is a requirement of all graduate level nurse practitioner students. This course is a combination of on-line assignments, clinical experiences, laboratory practice, and online examinations.

There are three design issues here. The first is customizing content based upon a student’s specialty. The second is customizing content review and presentation to match an individual student’s laboratory schedule. The third is that these are off-campus (distance) education students that are located throughout the state of Iowa and the six contiguous neighbouring states. A geographical perspective, Iowa and each of its neighbours are each about the same size as the south island of New Zealand. Solutions to these design issues need to be low maintenance for the instructors, in other words they need to be self-sustaining.

Regarding customizing content based upon specialty, within healthcare (in this case nursing) students often have identified a specialty focus, but in order for colleges to be resource efficient (staff, buildings, and monetization) in
their course offerings they often combine similar content into one course rather than offering several similar yet unique courses. The result is that course content ranges from relevant to irrelevant for different students in the same class. Historically, everyone had to learn and be tested on the same material, even if it was irrelevant and unrelated to a student’s focus area. This significantly impacted students’ motivation to learn during the course of a semester. It also impacted examination performance. Information that was relevant to a student typically received better examination scores than irrelevant information. Historically having to review irrelevant information was a significant criticism of this particular course by students.

Regarding customizing content based upon an individual’s laboratory schedule, laboratories are an expensive necessity of many science programs. Science courses often include laboratory time that allows students to explore and apply concepts covered in the lectures and readings. Because laboratories are expensive to create and maintain they tend to be the limiting resource within a course with many science courses having up to 20 laboratory sessions to accommodate a single course offering. For this reason, students in any particular college level class attend laboratory in groups much smaller than the actual class roster. Historically in this particular course, all students attended all laboratories, which was inefficient from a laboratory use factor since some laboratories were irrelevant and unnecessary to all specialty areas. In addition, laboratory availability for each topic are spread across several weeks and locations rather than offered consecutively within the same week and/or location. Because of the geographical area covered by students in this course, laboratory sites were provided centrally and adjacent to the borders of the state. Since historically the course materials were presented in a linear fashion it was possible for students to schedule a laboratory in advance of reviewing the course content or months after the content had been presented, which confused and frustrated students.

Regarding distance versus on-campus students: for many professions, such as nursing, historically obtaining advanced education and training was limited to students that had the resources to abandon their current professional lives and return to academia full-time. With the increasing availability of online graduate-level distance education opportunities more students are able to incorporate advanced education and training while remaining at home and continuing to work in their chosen profession. The challenge in creating engaging online distance courses is creating solutions for problems that arise because of the asynchronous nature of distance education. Solutions for off-campus courses typically are also have proven beneficial to on-campus students. In this particular case, personalization of content presentation was imperative to a healthy education life balance for students in this course.

**Methodology**

Like many universities, colleges, school districts, and organizations The University of Iowa has several technological resources available to enhance and support teaching and learning both on and off campus. This particular solution utilizes a Learning Management System (Desire 2 Learn known as ICON on campus) and a wiki (Atalassian’s Confluence). The University of Iowa has utilized a Learning Management System (LMS) since 1998 and has had a wiki available for use since 2007. The specific learning management system (LMS) and wiki are not the focus of this paper. Comparable products are available (both for purchase and open-source) that support the functionalities described in this paper.

The LMS features used included: the homepage to notify students; quizzes to evaluate student performance; and the grade book. The wiki features used included: labels, groups, and restrictions to determine which information was displayed to which specialty area; page edit and save for collaborative case study work and to sign up for laboratories; and comments to facilitate discussions.

The answer to the professors was, yes, there is a way to accomplish the course objectives if the content is broken into discreet enough segments of information. While this sounds like a relatively easy request, in actuality most instructors do not think about their course materials in this manner. After many meetings and iterations the following six specialty areas, nineteen content modules, and twenty-three laboratories were identified.
<table>
<thead>
<tr>
<th>Specialty area (wiki label)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult-Gerontology Nurse Practitioner (AGNP)</td>
</tr>
<tr>
<td>Family Nurse Practitioner (FNP)</td>
</tr>
<tr>
<td>Clinical Nurse Leader (CNL)</td>
</tr>
<tr>
<td>Nurse Anaesthetist (NA)</td>
</tr>
<tr>
<td>Psychiatric/Mental Health Nurse Practitioner (PMHP)</td>
</tr>
<tr>
<td>Paediatric Nurse Practitioner (PNP)</td>
</tr>
</tbody>
</table>

Table 1: The six specialty areas including the associated wiki label in parenthesis

<table>
<thead>
<tr>
<th>Content modules – wiki specialty label(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal assessment – agnp, cnl, fnp, na, pmhp, pnp</td>
</tr>
<tr>
<td>Cardiovascular assessment – agnp, cnl, fnp, na, pmhp, pnp</td>
</tr>
<tr>
<td>Cultural assessment – agnp, cnl, fnp, na, pmhp, pnp</td>
</tr>
<tr>
<td>Diagnostic reasoning and critical thinking assessment – agnp, cnl, fnp, na, pmhp, pnp</td>
</tr>
<tr>
<td>Female gynaecological assessment – agnp, fnp, pnp</td>
</tr>
<tr>
<td>Functional assessment – agnp, cnl, fnp, na, pmhp, pnp</td>
</tr>
<tr>
<td>Genetic assessment – agnp, cnl, fnp, na, pmhp, pnp</td>
</tr>
<tr>
<td>Genitourinary assessment – agnp, cnl, fnp, na, pmhp, pnp</td>
</tr>
<tr>
<td>Health history assessment – agnp, cnl, fnp, na, pmhp, pnp</td>
</tr>
<tr>
<td>HEENT assessment – agnp, cnl, fnp, na, pmhp, pnp</td>
</tr>
<tr>
<td>Integument assessment – agnp, cnl, fnp, na, pmhp, pnp</td>
</tr>
<tr>
<td>Laboratory assessment – agnp, cnl, fnp, na, pmhp, pnp</td>
</tr>
<tr>
<td>Musculoskeletal assessment – agnp, cnl, fnp, na, pmhp, pnp</td>
</tr>
<tr>
<td>Neurologic and mental assessment – agnp, cnl, fnp, na, pmhp, pnp</td>
</tr>
<tr>
<td>Pain assessment – agnp, cnl, fnp, na, pmhp, pnp</td>
</tr>
<tr>
<td>Pre-participation assessment – agnp, fnp, pmhp, pnp</td>
</tr>
<tr>
<td>Psychiatric assessment – agnp, cnl, fnp, na, pmhp, pnp</td>
</tr>
<tr>
<td>Pulmonary assessment – agnp, cnl, fnp, na, pmhp, pnp</td>
</tr>
<tr>
<td>Violence and maltreatment assessment – agnp, cnl, fnp, na, pmhp, pnp</td>
</tr>
</tbody>
</table>

Table 2: The nineteen content modules with associated wiki specialty labels
<table>
<thead>
<tr>
<th>Laboratories – wiki specialty label(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiology – agnp, fnp</td>
</tr>
<tr>
<td>College clinic – agnp</td>
</tr>
<tr>
<td>Day care – fnp, pnp</td>
</tr>
<tr>
<td>Dermatology – agnp, fnp, pnp</td>
</tr>
<tr>
<td>Family clinic – fnp</td>
</tr>
<tr>
<td>Genetics – agnp, fnp, pmhp, pnp</td>
</tr>
<tr>
<td>Health history – agnp, fnp, na, pmhp, pnp</td>
</tr>
<tr>
<td>Medical laboratory – agnp, fnp, pmhp, pnp</td>
</tr>
<tr>
<td>Mental health facility – pmhp</td>
</tr>
<tr>
<td>New-born nursery – fnp, pnp</td>
</tr>
<tr>
<td>Nursing education – agnp</td>
</tr>
<tr>
<td>Nursing home – fnp</td>
</tr>
<tr>
<td>Ophthalmology – agnp, cnl, fnp, pmhp, pnp</td>
</tr>
<tr>
<td>Paediatric cardiology – pnp</td>
</tr>
<tr>
<td>Paediatric orthopaedic – pnp</td>
</tr>
<tr>
<td>Paediatric psychiatry – pmhp, pnp</td>
</tr>
<tr>
<td>Paediatric pulmonary – pnp</td>
</tr>
<tr>
<td>Paediatric surgery – pnp</td>
</tr>
<tr>
<td>Paediatric urology – pnp</td>
</tr>
<tr>
<td>Pelvic model – agnp, cnl, fnp, na, pmhp, pnp</td>
</tr>
<tr>
<td>Perinatal – pnp</td>
</tr>
<tr>
<td>Planned parenthood – agnp, fnp, pnp</td>
</tr>
<tr>
<td>Primary care – pnp</td>
</tr>
</tbody>
</table>

Table 3: The twenty-three laboratories with the associated wiki specialty labels

Students used the edit and save functions within the wiki to register for the laboratories based upon their personal schedule. From the laboratory sign-up page they saw what content module(s) they had to review prior to attending the laboratory. After attending the laboratory they were tested over the materials in that module using the quizzing function in the LMS prior to continuing to the next module in their personalized schedule. Grades were automatically input by the quizzing function into the LMS grade book.

Recall that each specialty area reviews a subset of the entire content for the course and that the relationship between laboratories and module content varies between specialties. The best way to understand this is to observe how the specialty labels vary by content module and laboratory.

Discussion

There are many technological tools available for educational use. Often these tools are used at a simplistic level, overlooking their creative and synergistic potential with other available tools. For example, in this particular situation instructors were aware of the wiki, but had been using email to register students for laboratories, which was time consuming for the instructors and ineffective because laboratory times filled faster than the instructors could update the schedule within the LMS. By having students self-register in the wiki both students and faculty were aware of what laboratory spaces remained open in real-time and the administrative load on the instructors was reduced. In addition, the laboratory staff knew how many and which students to expect per laboratory session.

Using a wiki as a registration mechanism for laboratories is a creative use of its functionality.

Many times educators know or want to do things differently within a course, but often they don’t have access to the resources to do anything other than continue doing what they have done in the past. Even when resources exist, having the courage to ask for assistance and then trusting the assistance provided will work as requested are challenging for professors and technical staff that have done things the same way for a long time. Technology often advances faster and in ways that are difficult even for the most technically savvy user to stay abreast of. A request
made in the past for certain functionality that was inconceivable is built into newer versions of a product. For example, the ability to define sub-groups of students within a particular class and release educational content to those groups is a functionality that continues to improve as software evolves.

Breaking course materials into discreet chunks of information is beneficial for a variety of reasons. In this particular course, it was possible to customize the educational content covered by subsets of students within the course roster to match their specialty areas. It is also supports individualizing the sequence of content review by student. Breaking content into chunks supports reconfiguring content delivery, including being able to deliver appropriate remedial content when necessary.

**Conclusion**

The goal of this paper and associated presentation was to describe a complex problem experienced by a group of instructors that team-teach a course, explain how the problem was broken into its component issues, and then demonstrate the solution to the problem. Both the problem and/or the solution may be similar to issues that readers are encountering or may encounter in their own course development. The hope is that by sharing this situation it will provide insight into how educators might resolve their own issue(s) and/or inspire them to utilize similar techniques in courses they currently teach or will be teaching.

Technology is a tool that can serve both face-to-face and online education well when the outcome of its use is well articulated in advance of course development. Often a software tool’s capacity is barely understood and/or is under-utilized because the outcome for its use is unclear before development of the course begins. It is also possible that the software tool being considered is inappropriate for the task. Sometimes combining software tools is the best way to achieve a particular educational objective by using the strength(s) in each tool.

Because technology rapidly changes and students expect that educational material will be available in an electronic format educators are often unable to keep abreast of the best ways to use technology in their courses and know which technology will provide the best learning outcome(s) for their educational discipline and their students. Educators have enough of a challenge remaining current in their chosen discipline without the added stress of staying current with all of the potential technological options available to them. This is where the sharing of course creation challenges and solutions on a case by case basis can serve as a resource of how and why to use certain technologies beyond the manufacturer’s documentation. There is a misconception that using technology that contains certain features or functionalities will make a successful engaging online course. In reality it is how an instructor utilizes the technology that determines the success of an online course. Just because an instructor learns how to use a particular technology (what keys to press, what functionalities to include, etc.) this does not guarantee that a course will achieve its learning objectives. How an instructor utilizes technology determines a course's success or failure.

Every time a course is offered, whether face-to-face or online, there is an opportunity to evaluate how that course might be improved. Proactive instructors keep notes about difficulties encountered during the offering of a particular course so that these shortcomings might be improved the next time they facilitate the course. This only occurs when an instructor is willing to acknowledge that a course needs improvement. As the subject matter expert, instructors are able to articulate the problem(s) with the course and provide the necessary insight and information to improve the course. Being able to articulate the problem(s) also makes it easier to identify potential solutions from other disciplines and organizational structures, and create solutions with the assistance of technology staff.

Many educational content development problems seem insurmountable because of their apparent complexity. By approaching such problems with a fresh perspective and breaking the problem into its component issues it is possible to reconstruct educational materials in ways that better serve students and instructors.

Deconstructing and reconstructing course content into chunks allowed this course to be personalized to meet an individual student’s needs without compromising the overall integrity of the course. As a reminder, this process works best on course content where the sequencing of course materials is arbitrary rather than linear or consecutive in nature.
Acknowledgements

I would like to recognize the courage it took for Dr. Kerri Rupe, DNP, ARNP, FNP-C to describe the problem that she was having and the tenacity it took to create a solution for it. Thanks to her colleagues, Dr. Brenda Hoskins, DNP, ARNP, A/GNP and Dr. Mary Berg, DNP, ARNP, PNP for trying something new. Thank you to the SITA students that worked on this project, especially Nathan Culmer, and their manager Steve Silva.
Abstract: Change can be viewed as an evolutionary process in which the educators and their organisations are co-evolving with digital technologies (Davis, Eickelmann, & Zaka, 2013) and sometimes the co-evolution is stimulated by a shock that speeds changes in behaviour of the organisation as well as its staff and students. This paper presents the emerging findings in a case study of one College of Education that was impacted by seismic events in New Zealand. Documentary analysis and an interview of two staff indicate that evolution was prompted and has been sustained to enable the College to become more resilient. For example, with the adoption of a lecture capture system and also a move away from physical of assignments mailed to the college into online assessment managed through the LMS. This evolutionary process will be later evaluated though the generic model of organisational resilience by Resilient Organisations (2012).

Introduction

Since the start of the 21st century, there has been rapid growth in the range of technologies available to support learning in universities. There is also an increasing awareness that disasters and crises have and will continue to require higher education institutions to evolve rapidly and become more resilient in order to carry out their mandate of teaching and research. These stimuli have also influenced the decisions taken by individual academics and their institutions about introducing, developing and sustaining new approaches to learning with relevant technologies in universities and schools. Davis Eickelmann and Zaka (2013) view this as a process in which the educators and their organisations are co-evolving with digital technologies. Sometimes the co-evolution is stimulated by a shock that speeds changes in behaviour of the organisation as well as its staff and students. The paper focuses on the evolution of e-learning in initial teacher education and it’s fit with the development of resilience for those programmes and related services. The seismic events, especially in February, 2011 had a great effect on University of Canterbury (UC) which included the closing of the university for two weeks at the start of the 2011 academic year. It would be of interest to find out how initial teacher education programmes (ITE) in the College of Education (CoE) of UC adapted with e-learning in the wake of the seismic activities. The research question guiding the study is: How did Initial Teacher Education programmes and related services change as a result of earthquakes? What helped to build resilience (or not)? This paper aims to describe that co-evolution in one college as it responded to seismic events. The paper reports early analysis from two interviews and a small collection of documents.

Background

The College of Education, one of five Colleges within the University, has an established reputation for distance education and was amongst the pioneers of online learning in New Zealand with its first fully online teacher education course offered in 2001 (Mackey, Breeze, Buckley, Dabner, & Gilmore, 2011). It offers one of the largest programmes of initial teacher education in New Zealand (University of Canterbury, 2007). These programmes are offered to all sectors of education including early childhood, primary, secondary and tertiary education. The College of Education has considerable expertise and practice in e-learning, including an award-winning nationwide primary teacher education programme with a flexible learning option (FLO) accessible to students nationwide and occasionally overseas (Mackey, Davis, & Dabner, 2012). Flexible Learning Option increases flexibility to make University study possible for students who do not have the ability to get to a local campus and allow students to...
study, part-time or full-time in some programmes whilst they continue work, meet family responsibilities and pursue
other interests (University of Canterbury, n.d.).
As part of FLO, the College had also developed a very effective learning management system (LMS) called
StudentNet, which all students and staff had access to. The idea was that students would create an online community
for sharing of ideas and information relevant to the course. StudentNet was discontinued when the university chose
to focus on Moodle in 2008. UC College of Education runs ITE in Early Childhood Teacher Education, Primary
Teacher Education, Secondary Teacher Education Physical Education. The Bachelor of Teaching and Learning
(Early Childhood) and Bachelor of Teaching and Learning (Primary) programmes both include a FLO Option.
The E-Learning Maturity Model provides a means by which institutions can assess and compare their capability to
Model Version 2.3 Capability Assessment to conduct an analysis of the e-learning capability of The University of
Canterbury in late 2008/early 2009. He noted, among other findings, that the processes surrounding the creation and
maintenance of e-learning resources showed that the infrastructure in UC is robust, well designed, well maintained.
While Marshall (2009) recognised that LMS were often used in courses, he criticized that the processes associated
with institutional planning and management in UC were ad-hoc and depend on individual teachers, rather than being
a systematic component of the core teaching design.
Organisational resilience can be defined as “the ability of an organisation to survive a crisis and thrive in a world of
uncertainty” (Seville et al., 2012, p. 3). The concept of organisational resilience includes planning for
crisis but also considers traits that lead to organisational adaptability and ability to thrive despite adverse
circumstances (Seville et al., 2012, p. 4). It is important to recognise that all organisations may be seen to sit within
a larger ecosystem and to have smaller organisations such as departments nested within them (Davis, 2008) and that
resilience is required across multiple levels of the ecosystem. That is to say that the resilience of an organisation is
directly related to the resilience of the other organisations on which it depends (e.g. the organisations of customers,
suppliers, regulators, and even competitors). In addition, an organisation is dependent on the individual resilience of
its staff and the communities in which they live. One way that resilience can be built is by influencing organisations
to improve their ability to cope with and adapt to the consequences of crises and disasters. Resilience requires an
ability to pre-plan for improved resilience at both normal times and when un-expected events occur. This develops
the capability to constantly and continuously evolve to match or exceed the needs of its operating environment
before those needs become critical. Appropriate leadership and culture that promotes adaptive ability and innovation
within an organisation can embed resilience within decision making at all levels (Resilient Organisations, 2012).
Methodology
A qualitative case study research design was used for the study. Multiple sources of data were used for the study.
These were university policy statements, documents and reports. Members of faculty and management were
interviewed for the study.
Data collection
Cohen, Manion, and Morrison (2007) assert that a nonprobability sample can prove adequate and effective where
researchers do not intend to generalize their findings beyond the sample in question. On the limitations of this
sampling technique, Cohen et al. (2007) stress that, while it may satisfy the researcher’s needs to take this type of
sample, it does not pretend to represent the wider population it is deliberately and unashamedly selective and biased.
Three members of the teaching faculty and a staff at the general office in the CoE and documentation were
purposively sampled. Two different sources of data were identified, that is documents and interviews. Documents
were selected for their relevance to the topic analysed using themes informed by the literature reviewed above. A
semi-structured interview schedule was used for the systematic collection of interview data. To ensure content
validity the interview schedule was also given to an expert in the field for checking. Documentary analysis was
validated and enriched with the interview data. Interviewees were asked to supply any documents that they felt
comfortable to share, including stored emails. Data collection was carried out by the first author, who has minimal
experience of seismic events, supported by the second author, who was also his doctoral supervisor with extensive
experience of the seismic events. Permission and approval were gained from the university’s Educational Research
Human Ethics Committee. Publications of the University of Canterbury on disaster resilience were sought from
interviewees, the web, the library, Canterbury Educational Printing Services and Canterbury University Press, interviewee emails that participants were happy to share, course material, policy and reports made available.

Creswell (2012) has recommended the use of at least two approaches in any qualitative research in order to ensure credibility. The credibility of the interview data was established by providing the participants with the focus questions prior to the interview and the interviewees were given transcripts of transcribed interviews to obtain feedback from the participants regarding the accuracy of the recorded information. The evidence from documents, interviews and survey were then triangulated to improve confidence in the findings, and illustrate the case study in layers of thick description, as recommended by Yin (2008).

Data analysis

The data analysis process was in two-fold. Firstly, there was documentary analysis to determine the e-learning measures that the university/CoE had put in place in response before, during and after the three seismic events in September 2010, February 2011 and June 2011. Content analysis approach was used to study UC documents using the 13 indicators of organisational resilience. The documents were also studied across a timeline from 2007 to 2013. This was to explore if the documents relating to e-learning exhibited waves of evolution/devolution to resilience as a result of the seismic activities. This involved searches for patterns, themes and topics on resilience indicators, and assigning coding categories. Some of the documents were at the university level, others were published research and the rest were college level. The responses from the interview were analysed narratively with themes that were deduced from the interview. Sarantakos (2013) noted that narrative analysis is concerned with studying the life stories of people and how they understand their world. It deals with interpreting conversation or story by paying attention to the speaker’s embedded meanings and evaluations as well as their context (Wiles, Rosenberg, & Kearns, 2005).

Results

Documentary analysis results

The documents analysed for the study are listed in Table 1. The remainder of the preliminary results describes evidence of changes prompted by the seismic events, without an attempt to weave them into a story.

<table>
<thead>
<tr>
<th>Document(s)</th>
<th>Date issued</th>
</tr>
</thead>
<tbody>
<tr>
<td>UC Teaching and Learning Plan 2011-2013</td>
<td>Sep. 2010</td>
</tr>
<tr>
<td>UC College of Education Flexible Learning Guidelines</td>
<td>Oct. 2010</td>
</tr>
<tr>
<td>Learning (16 in total)</td>
<td></td>
</tr>
<tr>
<td>On-Line Marking Terms of Reference</td>
<td>Sep. 2011</td>
</tr>
<tr>
<td>FLO Quake Recovery Project</td>
<td>Nov. 2011</td>
</tr>
</tbody>
</table>

Table 1: List of documents used for the study

Twenty-one emails relating to the period of the study were received from Niki Davis. Sixteen of the emails had information relating to the use/disruption of e-learning during 2010-2012 and were therefore selected for the study. Some of the emails had documents attached such as minutes of meetings and reports. For example, an email to the FLO working group there was a proposal to the University Quake Recovery Project for temporary support for the centre that handled FLO students’ materials (DMAC) in which Niki said: “As a result of the quake disruption and lack of access to facilities and resources Course leaders are likely to be behind in course production and it is essential that new courses will be ready in time” (email to: FLO WG from Niki Davis on 18 May 2011 Subject: Draft request for funding for DMAC/FLO).

The earthquakes of 2011 resulted in the relocation of video conferencing equipment in a room set up for video conferencing in CoE. A series of emails were sent among staff to find the video conferencing equipment for use by staff in CoE.
Interview results

This section presents exemplars of influence of seismic events on e-learning in ITE in CoE derived from two lecturers identified as early adopters of e-learning in the CoE were interviewed. The interview was semi-structured in nature and the questions covered areas such as their training in the use of e-learning to teach, how their use of e-learning changed with the earthquakes, how they taught with e-learning, the role e-learning plays in their teaching, and the context(s) that influence how they use e-learning. The interview was conducted with two lecturers together because they jointly taught a course and this helped them to coordinate their responses; they also stimulated each other’s memory of events. Their names have been replaced with pseudonyms to protect their identities. The findings are presented with the themes that were deduced from the interviews.

Role in relation to e-Learning

In this theme, the lecturers reported on their initial interactions of e-learning. Whitney reported, “I see part of my role as making sure that everyone in the team is able to participate with e-Learning with our students”. She also

In September 2010 according to the UC Teaching and Learning Plan 2011-2013, the PVC (Learning Resources) was tasked with the responsibility to ‘Support and promote the development of flexible learning and distance education options (University of Canterbury, 2010). The document also noted that dedicated support staff will be needed. Programmes were to be provided to staff and student support to enhance the use of the learning management system(s).

A document, UC College of Education Flexible Learning Guidelines 2010, published by CoE outlined the expectations for academic staff who were offering courses enhanced with e-learning, including the use of the University of Canterbury Learning Management System UC Learn (UC College of Education, 2010, p. 1). These guidelines were particularly relevant for courses and programmes with FLO and were produced by the College of Education Executive Sub Committee for FLO (UC College of Education, 2010). In the Guidelines it was recommended that in order to enhance course quality and reduce workload, each college course has one (and only one) current UC Learn course site (UC College of Education, 2010). The guidelines may have made the CoE resilient in its programmes during the seismic events of 2011. These was also a change in the Computer/Internet Access and Course Material Statement of CoE on the College website as a result of seismic events for prospective students to read on the web and in mail outs: “To study at the UC College of Education you must have continual access to a computer with broadband internet access, and access to a printer’ This will also ensure that we are covered when we move to the online submission of assignments (email to Niki Davis on 17 October 2011 Subject: Final statement for ‘Computer Use’).

Furthermore, a document with On-Line Marking Terms of Reference in 2011 sought to identify the steps where necessary that require change or modification to enable assignments to be marked on-line. It identified training requirements for academic and administrative staff arising from the implementation of online marking. The seismic event of 2011 resulted in the loss of the Distance Material & Assignments Centre (DMAC) of CoE as it was in a building that was inaccessible. In 2012 it was agreed that where possible FLO/distance assignments would be submitted via Learn drop-box (FLO Guidance on Online Assessment, 2012). “The Academic Services Team in the College Office can receive FLO assignments that are submitted by FLO students by post via the Assignments Room in Ōrākāpaoa 116” (email From: College Office staff Sent: 14 February 2014 Subject: Exempt Assignments Procedure). It is useful to note that this has now become a norm for all students to submit assignments through Assignment Dropbox in the Learn.

• "One screen and the Polycom of the video conferencing gear has been removed from 215? Do you know where its gone and when it will be back?" (email sent on 18/07/2011 subject: OT215 video conferencing gear missing)
• Pseudonym A came and got it last week. Not sure why or how long (email sent on 18 July 2011, Subject: Re: OT215 video conferencing gear missing)
• "Apologies that you didn’t receive this news. Rest assured the video conferencing equipment has not been stolen but is being put to good use in KE06 on a regular basis due to the decisions that had to get made because of the earthquake." (email sent to Niki Davis on 18 July 2011 subject: RE: OT215 video conferencing gear - due back when?)
viewed e-Learning as part of the way that she could help best reach distance students in particular, but also using it for on campus students. Whitney's role has not changed much since 2010 although she is now coordinating more courses currently than before.

Whitney and Xantha indicated that they did not have any input into using e-Learning as part of that degree planning. Whitney remarked, “In fact I’m not even sure if it was particularly thought about to be honest. I think that e-Learning actually came after 2011”. Whitney also remarked that “I think the e-Learning and how do we reach our students best using e-Learning tools happened after the February earthquake. It was a direct result for me in my teaching, of the February earthquake”.

Xantha was of the opinion that “there was an assumption made in Early Childhood that we were set up really well for distance learning” as it was module based learning. Students come for face-to-face two days a month. She added that “when face to face was removed from our programme, as a result of the reconstitution of the programme we needed to start thinking about what does this now mean, how can we best reach our students”. Whitney added that when the February earthquake hit, “we weren’t connecting with the on-campus students either, because they weren’t here”. Whitney and Xantha discussed the issue of how to teach their on-campus students after the earthquakes. They remarked, “how are we going to manage, that we can’t reach our on campus students, but we still pretty much just got the modules that we would have used with our distance students, and got them to work through that, but we had to really think about, you know what’s happening for everyone, and how can we use some different technologies. Then in 2011, we actually had another colleague who started talking about Adobe Connect”.

The colleague’s enthusiasm in using Adobe Connect for teaching made Whitney and Xantha interested in using e-learning. They remarked “we started thinking, I wonder what that’s about, it sounds really exciting, I wonder what we can do about that. So in 2012 we had this earthquake year of trying to reach our students, … thinking about some ways”. Whitney and Xantha have been using the LMS to communicate with students but they felt it was inadequate. Thus their comment, “The ways we kind of reached our distance students was just using Learn (LMS) really just to post information. That’s what it felt like. Or we would put up a Power Point [files] and some questions for them to think about and the ways we kind of reached our distance students”.

E-learning tools adoption

The e-Learning tools adopted by the interviewees now described. Whitney and Xantha used Personal Capture in Echo 360 to enhance their teaching in a course for their distance students. They made 20 minute Personal Captures and put the videos online in the LMS. The feedback Whitney and Xantha got from the majority of the students was that they wanted the whole lecture that the on-campus students were seeing, because they felt they were still missing out on the discussion that might occur in the actual lecture. Whitney remarked that the students felt like they were disconnected from the course. Whitney and Xantha took on board a lot feedback from their students and decided to do full recording of their lectures using Echo 360. Lectures were just automatically recorded each week. Lectures given to on-campus students were automatically recorded and put up in the LMS.

Whitney and Xantha also decided that they would also use Adobe Connect once a week with their distance students in that course as well. They had never done it before but “decided to give it a go”. They found it hugely interesting and the students were grateful for it. On the use of other e-learning tools, Whitney and Xantha reflected, “Well, Learn was fine, all of our assessments are online for our courses. However, the ePortfolio was more challenging “MyPortfolio was a problem because we didn’t understand it.” Whitney and Xantha also remarked that “putting assessments up Learn worked for us particularly well …, even one with the resources which has lots of photos and stuff, was still fine for us. So actually online is not the problem for us”. They added that they both actually enjoy marking online. Xantha remarked, “I can type faster than I can write” while Whitney added, “I also think you can mark anywhere, you don’t have to carry scripts around with you.

“The students really connected with us in that course” recalled Whitney and Xantha. Whitney and Xantha reported on how “the students really could see the passion that the lecturers had for the course, maybe they felt that they couldn’t quite see that if it was written stuff necessarily”. Whitney and Xantha said that of their teacher feedbacks were really positive, and the evaluation of the courses were really positive from the distance students as well, “…they felt really connected, which was what we wanted to work on”.

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Support on using e-learning tools

When asked about support for e-learning, Whitney and Xantha stated that they did not have any training in the use of Adobe Connect. They remarked “we’d never had it before, and we decided we would just give it a go”. During the interview Whitney and Xantha recalled, “So we just got them to set us up. We hadn’t had any lessons on it. We’re kind of keen just to give it a go, which has its ups and its downs but I think um, if we had known a bit more…we probably still need some more lessons on how to use AdobeConnect”.

Xantha added: “in particular Adobe, because there’s some really nifty little functions there that we haven’t quite worked out yet”. They added that a member of staff from the AV service came over and “did all the Adobe stuff, he was fantastic but it was only like one session; he came over once and it was actually quite a bit of time before we did anything right.” Whitney and Xantha recalled that they took a year before they used that training having adopted Echo 360 lecture capture first. In their recollections they also mentioned being displaced from their individual offices and relocated in an office space shared by up to 10 staff, “It was, it was probably about six or seven months before we sat down and did anything, but in fact we didn’t do Adobe Connect for another year, it was rather Echo 360 we did and it was before we’d even, it was actually while we were in the hubs, right, at the beginning of 2011”.

Their response to a question as to the person who had helped them with Echo 360, they replied, “we just… actually…we just did it. We had those little fact sheets that they had, just worked our way through those really, it was really good”.

Effect of the earthquakes

This theme reports on the effect of the earthquakes on the interviewees. The earthquakes had influence on the use of e-learning by Whitney and Xantha. Whitney notes that “…definitely from the earthquakes, I think what really made us aware was that there were these other technologies out there that we could use to really connect with our students, like I think that’s the whole thing for us, is that connection”. She added, “Early childhood used the old StudentNet system [LMS], which was the student system, we always had things on StudentNet but for a very long time was information giving, like it wasn’t actually interactive, it wasn’t used interactively, and I think our, what modes of delivery, using technologies, wasn’t interactive, it was information giving. So that the Personal Capture Echos were just information giving really, there was no reciprocity in that, because they just sat and watched it”.

Whitney was of the opinion that “the earthquake gave us a bit of a shake, it kind of gave us the thought of, what if this does have to go on longer how are we actually ever going to know our students if we never see them”. She was worried that, “how are we ever, well how are we going to know someone who’s going to become a teacher, how do we find that out from distance students. How do we know they have the disposition to be a teacher if we never see them or hear their voice?”

Xantha believed that the earthquakes may have influenced the use of e-learning for teaching i.e. “I think the earthquake, yeah… I don’t know if we would have moved so quickly, had we not had the earthquake… In fact, if we’d had some of that technology beforehand I think we would have done it better. If we knew about Adobe, if we knew about Echo a lot earlier, I think the experience for students would have been much better in that earthquake year”.

Whitney concurred “I think earthquakes was the beginning and I think it was about the connection, but I also think the redeveloped degree was a connection because they stopped the students coming in, and so we suddenly started feeling like we weren’t connecting so well with the students”. She added, “we thought of campus and distance students as quite different. I think when the earthquake happened we suddenly had to treat the whole group of people that were all going to be distant, all going to be, and the on campus students of course had I think, um, gone on campus because they wanted that interaction, so we had to think, how are we going to do that? How can we, give them some experience where they are getting something that they feel like that’s what they’ve actually asked for”.

However, not all the events had an impact. Xantha indicated that the June 2011 earthquake did not affect her teaching thus “I don’t think June slowed us down that much because we’d already moved on”. Whitney added, “I
don’t think it did slow us down because we had that, in actually exam time when we’re out, then we had break time, and so…. so actually I think it didn’t really slow us down too much”.

The redeveloped degree in early childhood also affected the use of e-learning. This was because in the redeveloped degree Whitney and Xantha decided they would use more e-learning for their distance students. They recollected, “the students got these little Echo things and it wasn’t so good for some of the students who wanted full lectures because other courses were putting up full lectures. Whitney and Xantha had thought about the distance students’ circumstances when they decided to make the short video captures; rather than record full lectures, they added, “we thought we’d put up these little succinct things [video so] that we wouldn’t have to be using broadband. We’ve just had this discussion about whether to put up full [lectures] or Echos [short recordings]. Our data showed really clearly that [the students] wanted full [lecture]. That might just have been the cohort of students.”

Whitney also remarked that other people do not like the lectures being videoed “because they feel like it restricts their movement, as you know, the camera is kind of fixed. Xantha, who is a course leader with a number of staff teaching into it remarked “one of our lecturers is really adamant does not want it to be videoed, because it feels like it restricts their ability to move around the lecture theatre and we’re [currently] having to do some negotiation about that”. Whitney and Xantha concluded, “We’re at the point where we think we might put both up and do a little, this is a snapshot of the lecture if you don’t want to watch the whole thing, if you want the whole thing… you go for it, you choose which one you want. I think that’s probably where we will head to, we will head to the full lecture the Echo and do it that way.”

Whitney and Xantha also reflected on whether it was equitable for on-campus students to have access to the Echo recording, the lectures as the distance students and that there has been discussion about it. Xantha added that it was noticed a previous year that attendance in one of the courses was quite low because students assumed that as the lectures were being recorded they could just opt out and watch it at home. However, they did not realise the implications of their actions since students have to attend at least 80% or participate in 80% course materials and content else they cannot go out on teaching practice. This was stated in the course outline.

**Future plans on use of e-learning**

On future plans on using e-learning for teaching Whitney and Xantha resolve to “up-skill ourselves a little with the tools that are out there, and thinking of other ways of doing some things as well”. Whitney added “I’ll be doing the Adobes [web conferencing] with them so, [I will] show them how to link in [use Adobe software], and give them some experience of talking and stuff”. Xantha remarked, “we had someone actually in this year’s course evaluation, who said I finally found out how to connect to [Adobe within] the course”. Whitney remarked that a colleague down the hall informed her that she wants to learn more about Adobe and how to work it, so “I’m thinking we probably really should just see if we can get PD [professional development] in for ECE [our programme] or one of our department meetings around using Adobe, you know, this is some of the features of Adobe”.

Whitney and Xantha had planned that in the new academic year distance residential programme they would have two sessions where one will be dedicated to the LMS course site, and one to Adobe Connect. They also had plans of “pulling some other people of the team in to get them up-skilled as well and to do some of that Adobe”. Whitney added, “I helped two Primary [staff] and so they feel a little more confident this year”.

Also for their unit in the programme it has been planned that every lecturer will “do a lecture that will be videoed here, or videoed up there or wherever it is. So that was kind of a way we thought that could you know involve the voices of the staff, and the passions they have for the areas they have. They will actually use the Echo 360 software”.

As part of the on-site intensives for distance students at the start of the current year in 2014, Whitney and Xantha “sort of scattered the students all around in pairs all over the campus, and then they just Adobe’d into a site, doing all the Adobing, connecting and stuff”. This was done so students could experience what they will be doing when they are home. Xantha explained that that the students will get to know “this is the link I need to link into and that never changes, so every week we get what’s the link. Whitney and Xantha concluded, “the use of e-learning and particularly for TEPI is we have our distance campuses is that the Echo allows them to be part of, so this semester a couple of them are going to be doing Echos that our on campus students will have the opportunity to watch.
Otherwise they feel they don’t really contribute because what happens is, all our lectures get videoed, and they feel like they don’t have the opportunity to be part of that in some ways”.

Next steps

Further interviews and documents have been gathered and more will be sought until a rich case study emerges with few contradictions. In addition, the generic model of organisational resilience by Resilient Organisations (2012) has been adapted to analyse the resilience of UC through e-learning. They identified 13 indicators of organisational resilience, (see Fig 1). The next analysis for this research will seek indicators of organisational resilience as recommended by Resilient Organisations (2012) in the case study findings for this CoE. It will be complemented with categories drawn from the E-Learning Maturity Model Version 2.3 Capability Assessment released by Stephen Marshall (2009).

![Figure 1: Indicators of organisational resilience (Resilient Organisations, 2012)](image)

References


**Acknowledgements**

This research has been supported by a UC College of Education PhD scholarship and supervision by Associate Professor Una Cunningham. We would also like to thank the participants and the University for permission to use relevant data.
Educational Design for Experiential and Authentic Learning: Case Study of the Use of e-portfolios for Assessment

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Abstract: This paper reports on how student teachers in a Graduate Diploma biology class used electronic portfolios for recording their experiences of authentic practice and learning. The study focuses on students’ unprompted reflections that were part of a summative assessment and categorises how often students reflected on ways to learn content knowledge, and evaluate pedagogy, resources, as well as make links with their observations of associate teachers, school students’ class work and their own teaching development. The analysis is discussed in terms of the students’ comments and the implications for adjustments to the guidelines for the associated assessment so that student teachers are encouraged to become more aware of how they can learn through observation of class activities (both initial teacher education and school class observations) and include more reflections on the evidence of student learning to inform next practice.

Introduction

Recently a consideration of the design principles for exemplary initial teacher education programmes and courses have been discussed in terms of how they take account of the research on how people learn, the trends in the use of technologies and other findings from research on the conditions necessary for innovative learning environments (Conner & Sliwka, 2014). It is important to re-examine what is included in teacher education programmes and courses to provide direct experiences of authentic practice and learning to foster and model the development of a range of competencies including social and meta-cognitive skills to improve student learning. This paper focuses on the first principle as indicated in OECD (2010): The learning environment recognizes the learners as its core participants, encourages their active engagement and develops their own understanding as learners. This applied to the philosophy of the pedagogical approaches used in the biology curriculum course, and hence what was modelled, as well as the expectations placed on the student teachers to develop their own active reflective engagement using experiential and reflective learning.

As adult learners, the student teachers themselves can direct experiences to support their own learning (Dewey, 1938). However, they need examples and tools to reflect on their experiences as learners; and they may need support to figure out what is working for them and what else they need to know as they set and review goals, and assume responsibility for their own learning as active learners. Being familiar with what and how one can teach is a necessary condition for teachers to support effective learning. This not only applies to enabling learning of content knowledge but also to enabling learning about the processes of learning. Therefore it is important in teacher education courses to highlight the importance of reflection as a tool for identifying what they are good at and what they need to work on. Teachers’ self-assessment therefore forms a key part in their professional development (Beck, Livne, Bear, 2005; Buzzetto-More, 2010).

Conner and Sliwka (2014) have emphasised that teacher education courses are more likely to be effective if content is applied to appropriate learning contexts, when there are repeated opportunities for reflection, and student teachers experience good modelling of practice by teacher educators and teachers in schools. Effective modelling by teacher educators (Goodlad, 1990) relates to Vygotsky’s (1986) concept of relational imitation. As Goodlad (1990) wrote, “We recommend, then, that the responsible faculty plan not just a sequence of courses and field experiences but deliberate demonstration of pedagogical procedures their students will be expected to use in the practice part of their preparation programs” (p. 291).
Student teachers in the Graduate Diploma programme for secondary teaching complete 14 weeks of professional practice in schools. Therefore student teachers experience authentic teaching situations in schools that provide useful sources for observation and reflection. In addition, their experiences of learning in courses while at the university can challenge their previous conceptions of learning and help them to identify their own strengths and areas to work on.

Given that the variety and sophistication of educational software being used in schools is burgeoning, student teachers also need to have multiple opportunities to become aware of and experience a wide range of digital tools as they develop their knowledge, learn to teach and develop their expertise. As mentioned in the NZ Ministry of Education “While everyone is aware of the rapid evolution of technology, not everyone is aware of the new and different ways in which people are using the technologies in teaching, learning, and communication; and the emerging pivotal role of the digital portfolio in a learner’s education and life” (Ministry of Education, 2011, p.3).

Eportfolios are now a well-established tool in initial teacher education that can provide beginning teachers with a space and tool for supporting their ongoing professional learning (MacEntee & Garii, 2010). They have been used as a way for student teachers to recognize patterns, yet they can connect to personal, internal and external examples to show the relevance and application of their thinking and learning. The inclusion of eportfolios as a requirement for an assessment in an initial teacher education course also places emphasis on the importance of knowing about and using eportfolios as a learning tool for students who will be in their classes in the future (Hauge, 2006).

The use of ePortfolios can assist self-directed learning in what Conner (2014) has called evaluative constructivism where learning is an inquiry oriented, self-questioning activity through purposive and intentional processes for learning. Using reflective writing, student teachers can construct meaning from their previous and new experiences and develop their adaptive expertise (Hatano & Inagaki, 1986) where they modify, adapt and adjust approaches to teaching and learning and apply these modifications to specific teaching and learning contexts (Darling, 2001).

This paper reports on how eportfolios were used to integrate student teachers’ reflections on pedagogy, practice and theories of learning and teaching in a pre service biology curriculum course. As part of modelling a process of active engagement, reflective learning and adaptive expertise, students in a senior biology curriculum course for secondary teachers, were expected to write 5 reflective statements in their eportfolio. The instructions were:

1. Each student is to set up and create a Biology View in ‘MyPortfolio’. (See the ‘how to’ section for instructions)
2. As a key component of your e-portfolio you are to keep a ‘reflections’ journal. This is an on-going record of your thoughts as you reflect on the progress you are making, this could be about your own pedagogical content knowledge, or how certain lessons may have gone, or observations from the classroom.
3. There should be at least 5 reflections over the whole semester. As each one is written please share it with me so I can provide any necessary feedback. When on Teaching Practice you will also keep a journal, and there may be some overlap in your reflections. This is not a problem.
4. At least 2 examples of online resources should be included where web 2.0 tools have been used. These will be covered in class and a url link can be inserted as a link. When this is done, please reflect on the use of this tool, and its possible use in the Biology classroom. Examples include the use of quizlet, voicethread, animoto, or others as appropriate.
5. If possible, please include examples of student work (anon) or activities while out on teaching practice that show the use and application of different teaching strategies. These can be included as part of your reflections above, i.e. how well they went, what would you do differently next time etc. These examples could be written, or photos of student work. (e.g. models, photo of an experiment, and example of student produced work using and ICT application etc). Ask permission first, but these examples can help you when applying for positions later on and provide good evidence about what sort of teacher you are. (LEARN TECS 383 site, Assignment information).

All assignments for this course were uploaded to their eportfolios. This study considers how students spontaneously reflected on: *What do I need to know or do more of?* as indicated by their 5 reflective paragraphs that were required as part of this assignment. Students were also provided with an on-line example of 5 reflections.

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Findings

The students wrote a mixture of types of reflections based on their professional practice observations, what they had learnt in class and in their own time, and how these linked with their development as a teacher. Students included visual links to the ideas they were reflecting on such as hyperlinks to activities, online resources and web supports, youtube videos, and some students added graphics and pictures to illustrate their ideas. Their reflective statements were reviewed and categorized according to their identification of strategies for learning about content, and evaluating pedagogy, resources, observations of associate teachers, class work and their own teaching development as shown in Table 1. The reflections come from a sample of 11 students from this class who agreed to allow me to use their reflective statements for research purposes.

Although the sample size of students is small (11), the data indicate that students mostly reflected on specific resources followed closely by statements about pedagogy. A pleasing find was that all of these student teachers made links to their own teaching (Table 1) but to varying degrees. Their reflective paragraphs did not identify many strategies to help them bridge their gaps in their own content knowledge. This may have been because during the course, there was an emphasis on establishing ways that school students can use inquiry to find out information they need, rather than expecting that the teacher will know everything.

### Table 1: Content Analysis of Reflections written in eportfolios (# times)

<table>
<thead>
<tr>
<th>Student</th>
<th>Identified strategies for their learning about content</th>
<th>Identified learning about pedagogy</th>
<th>Identified resources to support teaching</th>
<th>Links to reflection on assoc teachers’ teaching</th>
<th>Links to experiences in Bio class</th>
<th>Links to their own teaching</th>
<th>Links to evidence of student learning for next practice</th>
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A surprising find was how little they included statements that reflected on what their associate teachers in schools did or on the teaching and learning experiences they had in this particular biology curriculum class. Given that the assignment brief also suggested that they use evidence of students’ work to support their reflections, students who did this only used observational and anecdotal evidence rather than students’ evidence of achievement or work samples/ assessment outcomes. This will be a focus for modifying the assessment guidelines especially how more could be made of evidence of learning through emphasis by the teacher educator in future iterations of this course.

The next section provides specific examples of their reflective statements and what they wrote about their developmental needs.

**What do I need to know or do more of?**

This section is divided up to provide examples of each of the categories in table 1.

### Strategies for their learning about content

Not many students commented on strategies that they identified would assist their own learning of biology content knowledge. This is not surprising since it was not part of the instructions for the reflective statements. However a couple of students commented on how it was a gap in their expertise that they were aware of, for example:
Student A: I need to study hard so I know my stuff, and learn it to point that I can recall knowledge quickly and easily.

Several others commented on ways to encourage school students to support each other with developing content knowledge and to use appropriate student engagement strategies to do this. This included the following statements that show their awareness of the need to monitor learning and how important student engagement is in the learning process.

Student C: I saw that students were actually learning the content I was teaching (I don’t know that they weren’t learning it before, but I doubt it. It was nice to know they were learning from my teaching). It goes to show the importance of being creative and finding ways to teach that your students respond to instead of sticking to the same old thing all day, every day.

Student I: The more able students (conveniently half the class) would really enjoy teaching their peers one on one, and their peers seemed to enjoy learning from a more relevant perspective for a change. I was able to monitor the accuracy/enthusiasm of the teaching and was really impressed with how the material was being explained (by the students themselves). It also not only keeps the more academic students engaged, but also reinforces the understanding of the material greatly.

Student A: I asked the students in year 12 to create a poem, song, rap or coloured storyboard that summarised DNA replication (I gave them a list of keywords that had to be included in the summary). They did this task in pairs, and had to present their finished song/rap/storyboard to the class in the final lesson. The level of engagement that I got from this task was huge – the students loved it! And the quality of the performances was great. All groups chose to do either a song or a rap, and they were so creative and summarised DNA replication really, really well. Not only this, but I heard them singing the songs they had created down the corridors and at lunch time after they were finished.

Student H: I did manage to learn the basic concepts, however I seemed to always lack the in depth understanding that was needed to answer some of the students’ questions. This definitely had an impact on my teaching… To help get around the problem, sometimes I would get students who really understood the concepts being explored to explain things to the class or individual students who were having trouble. This worked really well, because it gave those students who knew the content the opportunity to practice presenting their knowledge.

**Pedagogy**

All of the students in this sample identified some aspects about their development of pedagogical knowledge and linked this to specific examples of digital resources, their benefits and some of the drawbacks as well.

Student E: This free to use app literally does it all. Evernote lets you create notes and save them in different notebooks. The diverse text editor gives you a lot of freedom when creating the notes to ensure that you can add whatever you want in, making it a great lesson planned. Additionally, you can save the notes you make to different notebooks that you can title, allowing you to organise each your classes separately. The tablet version of the app also allows for you to draw free hand, which if being projected on screen, can be incredibly useful. …With this feature, now you can write or draw on tablet and watch it appear live as you draw it, with no viewing interference.

Student J: Mindmeister can benefit my students in a variety of ways. My students can use it for effective note making and organisation. They can also use it for revision and it can be a collaborative experience because they can share it with their friends who can then also get a copy and edit it further. I can use Mindmeister for conceptual development of my unit plans and the topics I intend to cover each week. I can then share this information with my students which can be used by them in preparation and planning. I can use this as Diagnostic as well as Formative assessment as a quick review of the topics we learnt in class which can help in further development of concepts or reporting to their parents.
Student I: A downside to this is that it requires the Slowmation programme to be installed as well as that the process can be quite lengthy as I found when producing the Slowmation movie attached on Osmosis.

Some of the reflections on pedagogy were more general statements that indicated an awareness of the need to provide a range of learning experiences. For example,

Student K: We as teachers need to address this issue and start making steps towards incorporating more hands-on tasks in lessons. In biology this doesn't necessarily mean we have to start doing more dissections or bacterial streaking. What it means is that we have to start taking different approaches to presenting the same material.

Student E: Games and activities are perfect for formative assessment because the more students interact and share, the better they are learn. Students can be learning and not even know it.

As part of the modelling of good practice, there were times in this biology curriculum class where the instructor specifically made use of strategies and why they might be useful. Some of these appeared in the students’ reflective statements as indicated below.

Student A: they had to think about the process in order to verbalise what they were doing (by talking through the steps as they moved through them with the model of DNA) so that by the end of it they were each able to write a really good summary of the steps of protein synthesis. I think that getting students to talk through their model is a really vital part of the process, whether it’s just to a partner or to the class. If they just made the model, they’re not really engaging with the content; they need to show that they understand how the model works, and explaining it out loud is a great way to achieve this.

Student E: In class we have been given multiple examples of how to use this pedagogy of learning and it allows the students to take control of their learning, be creative, and use critical thinking skills that are necessary in all subjects but also very beneficial to biology.

Student E: Because I do not have the most experience in the labs and facilitating activities, I found that the activities we did as a class helped my understanding of how labs work and how to organize them. It will be very helpful to be able to go on our (biology) group page and use the lab activities that have been posted.

Student K: I do like the idea from class of making a video to present to the class as (school) students aren’t always confident with getting up in front of the class.

Student B: I will also be making full use of the sharing system that myPortfolio offers users. This has been very useful as I can see others resources and plans and with permission be able to use them in my teaching, and if I feel like it making adjustments to those to suit the class I am teaching.

Table 1 and the student teachers’ reflective writing indicate that the use of the eportfolio for recording their reflective statements resulted in substantial gains for them as learners. This especially applied to identifying and critiquing resources and considering pedagogical approaches and how these applied to their own teaching.

The requirement to post five reflections as part of a summative assessment, placed value on this activity as a process for learning and as a model they could use with their students in schools. Naturally, there was variation as to the extent that students reflected on their own teaching, aspects of teaching and learning that they observed during the course sessions and observations of their associate teachers in schools. The number of times they made these links was somewhat disappointing and therefore a focus on these three aspects is a potential source for future development. Students could make much clearer connections with their observations of associate teachers and potentially learn more by specifically focusing on their own teaching.
Discussion

Using eportfolios and sharing these reflections amongst the participants in the class leveraged their experiential and situated learning that made it authentic which has been determined as two significant factors that can support students’ learning, motivation and retention of content (Chen, Calinger, Howard & Oskorus, 2010). The power of using eportfolios supports social learning processes because students can view and see each other’s reflections, yet none of the students commented on eportfolios as a site of learning in their reflective statements. The use of ePortfolios by student teachers supported their development and experience of developing and sharing their knowledge about biology content, appropriate teaching and learning resources, pedagogical knowledge and application of all of these to their own professional practice. It also enabled them to participate in a student-centered learning activity since they are individualized and customizable. This allowed them to choose what to write about, was self-paced, and therefore was self-directed. That is, the student teachers were given control over the content and links that they chose to make, rather than prescribing the topic for reflection.

Some student reflections indicated they were able to consider how they would apply the use of resources or pedagogies in multiple contexts, but in many statements this was not evident. For some students (5), this was because they were majoring in another subject (either mathematics, chemistry or physical education) and therefore were not given a senior biology class as part of their professional practice. However, many of these students related their biology teaching to experiences they had with years 9 or 10 classes when they had taught biology topics with these classes. It also seemed important that while they are choosing what to reflect on, they indicate why they selected particular approaches, resources or experiences (Knight, Hakel & Gromko, 2006) and how they used examples or pedagogy to illustrate their deeper learning and transference to other contexts or next practice. When student teachers are consciously aware of how they can appropriate content and pedagogy, they are more likely to enhance their adaptive expertise (Darling, 2001).

Several students had not used eportfolios previously so through having experienced using them, they would be more likely to use them with their own classes in secondary schools in the future. Having to learn about the functionality of myportfolio coupled with their comments about other ICT tools and resources enhanced their awareness of access and use of digital resources and on-line interactive activities. The eportfolios also provided a tool and easily accessible space for sharing their ideas with the other class participants, further enhancing their learning opportunities. In this class, the student teachers used eportfolios for documenting their reflections and evaluations of resources they found useful for teaching biology. Perhaps more importantly the eportfolios acted as a trigger for reflection, a source of evidence for an assignment and a repository of ideas they could use in their teaching. Because they were able to access each other’s reflections and resources, it served to extend their own thinking and toolkit for resources alongside pedagogical considerations and understanding. However they did not make as many links to their own practice nor base their next steps in teaching on evidence of learning as frequently as I would have liked (Table1).

The timing of the writing of the reflective statements as part of the course was also important. As it is scheduled, the course has two five-week teaching blocks punctuated by seven weeks of professional practice in schools. The students in this class did not write their reflective statements until well after their professional practice in schools. Therefore there was a social learning opportunity during their professional practice that was not well leveraged as indicated by Evans and Powell (2007). There is also scope for allowing students to extend beyond the five required reflections, especially given the power of sharing their reflections and how this can support professional learning socially (Hauge, 2006). It would be interesting to include the flexible option of students posting more than five reflections and to ascertain whether this would help to address to some extent what Orland-Blank (2005) calls “what remains untold”. That is through repeated reflective practice, student teachers may become more confident and willing to share what has not worked and their learning from these experiences more. If they are encouraged to create reflective statements throughout a course, then the option becomes which reflective statements do they choose for evidence for the summative assessment. As it stood students only produced the minimum number required for the assessment.

Other advantages of using eportfolios more generally include: their total mobility, they are easily shared with anyone, anywhere, facilitate shared learning, reproducible, improve ICT skills, provide support for the development of future teacher actions, enable a personal approach to learning and development as a teacher, provide evidence and
examples of development (Barrett, 2000). They can also include multimedia and embedded files, as well as enhance the development of new learning and make connections to prior learning. Therefore there is wide scope to explore how the use of eportfolios in initial teacher education programmes can be incorporated into course design to support the development of ICT capabilities (Chen, Calinger, Howard & Oskorus, 2010) and for assessing student teachers progress towards becoming a reflective practitioner (Cooper & Love, 2007) through showcasing evidence or learning (Delandshere & Arens, 2003; Denner, Norman, Salzman, Pankratz & Evans, 2004).

Conclusion

While the student teachers appreciated becoming familiar with eportfolios as part of this senior biology curriculum course, they were only beginning to realize the power of them for supporting their own learning. There were multiple examples of how creating reflective statements in eportfolios provided a space for them to reflect on authentic experiences and consider the implications of these for their own teaching practice. Mostly they identified resources and reflected on pedagogical approaches. Very few students made links to evidence of students’ learning to inform their future teaching. There is scope then for student teachers to be guided in developing a more mature eportfolio as described by Challis (2005). The implications of the findings of this study are that future iterations of this course will make more explicit what we are doing in the face to face sessions and provide time for them to reflect on what they have learnt in sessions, as well as place more emphasis on multiple ways for observing, collecting and providing evidence of students’ learning as a source for teacher reflection on their approaches.

Acknowledgement

I would like to thanks all the student teachers who participated in this study and my colleagues who listened and commented on my findings.

References


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Language Teacher Education in a Digital World

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Abstract: This paper outlines what would be required of an initial teacher education programme for secondary language teachers that prepares its graduates to a) meet the demands and affordances of the learning environments they are being prepared for; b) use the technology available to enhance their students’ language learning; c) flexibly respond to and initiate future developments of technology and language pedagogy and d) participate in online sharing and building upon materials, insights and strategies with other language educators.

Digitally Literate and Technologically Capable

A language teacher needs to be able to use the technology that is being used in school. Now it is not, of course, possible for any initial teacher education programme to prepare students for all the technology they will meet once they graduate. Anything we can show them will be old before long. What we can do is to prepare them to continue learning how to use technology, but more importantly to know when and how it might be useful to them and their language students. As our schools prepare for increased connectivity, thanks to the ultrafast uncapped broadband being rolled out to New Zealand schools, students and teachers will have generally good availability of the devices they need to access technology and as much access to the Internet as they can use.

Although many teacher students are young, they may not have extensive experience with a wide range of digital tools. Bennet & Maton (2010), in a study of students’ technology experiences, concluded that while many young people used some very common technology-based activities, the use of other tools was highly varied. Equally, while some young people used a large number of tools for many different activities, others were much more restricted in their digital practices. They further pointed out that casual use of technology-based activities may not prepare students for academic practices. This means that not all beginning teacher students can be assumed to be knowledgeable about how to use digital tools, and they may or may not be digitally literate in the sense of being critical consumers and producers of information accessed through digital tools. By the time they graduate as teachers, however, they must meet the Graduating Teacher Standards for New Zealand teachers, which include the requirement that graduating teachers “demonstrate proficiency in oral and written language (Māori and/or English), in numeracy and in ICT relevant to their professional role” (Teachers Council 2008).

So, what ICT is relevant to the professional role of a language teacher? Schools in New Zealand are often very well equipped. Some are one-to-one schools where a laptop is available for each student, or BYOD schools where students bring their own tablets, laptops or maybe even smartphones to school. There will generally be projectors or Smartboards available. Access to software and to support and professional development on how this technology might be used by language teachers may be patchier in many settings. There is obviously a potential here for recent graduates from teacher education and for teacher students on school placements to share what they have learned during their teacher education with their colleagues in schools as well as to learn from the experienced practitioners. A newly qualified language teacher in 2014 needs knowledge about digital tools and materials available to them, and about the rules and norms governing their use. In addition they need to have extensive technical skills including knowing how to send and receive e-mail, how to produce and share texts and presentations incorporating pictures and sound, how to source and critically appraise authentic (i.e. not produced specifically for learners) language content, how to use (in a professional way) some of the more common social media tools, how to use online dictionaries, corpora and translation tools, how to use digital material created by others and how to create such material and share it with others.

Netsafe (2010) claims that digital literacy, i.e. the ability to understand and fully participate in the digital world, is fundamental to digital citizenship. According to NetSafe, a New Zealand digital citizen is, among other things, a confident and capable user of ICT who uses technologies to participate in educational, cultural, and economic activities and is literate in the language, symbols, and texts of digital technologies. Language teachers obviously
need to be digital citizens, and there is no excuse for contemporary language teacher education not requiring this knowledge and these skills of its graduates.

Digital Professionalism

Graduate teachers must be able to move on from their position of competent digital citizens to one of being members of the teaching profession in a digital world. As soon as they embark on their first school placement experience, they are no longer private individuals. Before they land in classrooms, teacher students need to examine their digital footprint. If a Google or Facebook search on their name throws up anything they would rather their principals or prospective pupils or their parents did not see, it may already be too late, but it might be possible to set privacy settings to ensure that as little as possible is available to the casual onlooker. Teacher students need to learn about managing their digital identity and helping their students to manage theirs. Looking forward, teachers and teacher students in school placements will usually be well advised to keep their private life and their professional life well separated.

Schools may have IT-policies for staff, but even if they do not, teacher students in all curriculum areas should have thought through how they will answer a request from a pupil or from a colleague to be an online friend. A way around this might be to have a dedicated teacher identity that is quite separate from the identity they use with family and friends. This will be especially important where teachers want to use social media for teaching purposes. Teacher students need to be aware of the difference between using social media casually in their private lives and using it purposefully for teaching. The same can be said of e-mails or text chatting that the teacher student may want to use in their teaching. Professional conduct and language use are important and likely not to be the same in chatting with their own adult friends and chatting with learners in a homework chat or virtual office hours for parents. Videos or songs in the target language that the teacher student may find funny and engaging may not be suitable for young or teenage learners, because of inappropriate images, content or language.

Digital Practices in School and Out of School

We have some information about the digital practices of young people, thanks to the World Internet Project New Zealand survey of the Internet use of more than 2000 New Zealanders in mid-2013 (Gibson et al 2013). They found that young people (under 30) see the internet as important for entertainment (80%) and for, information (91%). Young men (94%) and young women (96%) use social networking sites; 89% of young men and 90% of young women use Facebook. For online games engage 72% of young men and 67% of young women. And what is more, these users are accessing the internet from handheld devices at least part of the time. Clearly young people in schools are spending a lot of time online, not only when they are in front of computers, and certainly not only at school. Some users are accessing sites in languages other than English and many are using the internet to translate words or phrases into other languages. The challenge then for language teachers in New Zealand is to embrace this digital activity and to channel it in ways that enhance the learning of the target language or languages. Teacher education, both pre-service initial teacher education and in-service professional development, has the responsibility of helping teachers to build the knowledge and skills do this.

If the students are used to accessing entertainment (tv-shows, films, music etc.) online, it is but a small step to ask them to access such material in the target language for extensive input in whatever genre and field they prefer. The possibilities for language exposure are considerable and include activities such as manipulating subtitling to let them view their favourite shows with target language subtitles, or even dubbed into the target language, with or without subtitles in English or the target language. Language teacher education can examine this potential, and consider the opportunities for input and output these media-based activities offer.

If learners are gamers, they may well be interested in or already be playing with gamers who use the target language. This is certainly the case for some learners of English in countries like Sweden where English is a foreign language (Sylven & Sundqvist 2012) or in Thailand where Reinder & Wattana (2011) examined the situation for university students. Similarly, Rama et al (2012) looked at American learners of Spanish playing the Spanish version of World of Warcraft. While not all language teachers are or want to be gamers, they should be aware of and supportive of their students’ gaming as a language activity. Any situation where learners can use the target language for authentic communication will benefit their learning. As well as being aware of the potential of games as a reason to
communicate in the target language, language teachers should be well aware of games that are specifically intended for language learning. There is certainly a wide variety of language learning games available, and language teachers should be familiar with some of these.

Educational gameification has come a long way since the first transposition of language drills to computers. At the moment, Duolingo (www.duolingo.com) is an exciting application to watch. It involves learners in translating sentences of real web content from their target language to their first language. Language Perfect is a New Zealand system for vocabulary learning in schools with a competitive element where students can compete against their classmates as well as with other classes. It is very popular in some schools and tertiary institutions. The gameified learning provides a sequence of rewards and tokens that can be used to purchase access to language learning materials. Language Perfect focuses on vocabulary. While the items are thematically organised, they are generally presented without much in the way of context. This is actually in line with work by Nation, indicating that deliberately learning vocabulary can result in large amounts of well-retained useable knowledge (Nation, 2001, pp. 296-316). This means that the acquisition of advanced vocabulary can be accomplished with decontextualized learning, as low-frequency words just pop up too rarely to allow them to be acquired incidentally and may need to be learned when “the more useful high frequency words are already very well known” (Nation 2005, p. 18). Language learning textbooks often have gameified and more traditional digital material associated with them, and teachers and language students in schools often use this enthusiastically. Language teachers need somehow to gain knowledge of what is available and what pedagogical purpose it may serve.

The Flipped Classroom

The concept of the flipped classroom, where learners access material on new content outside of class and do what used to be homework in class with the support of their peers and teacher, is not entirely new, but the availability of web access and the ease with which web-based material can now be produced mean that language teachers can individually or collaboratively create resources for their learners and spend the contact time they have available for interactive and individualised activities. This offers the opportunity of optimally using the classroom time for interaction between students and student(s) to teacher, by delivering any one-way communication digitally for students to access before and after class and/or at the point of need.

Simple drag and drop web editors, e-book creators, screen capture systems for making videos with audio of a Powerpoint presentation or whatever is happening on screen (such as Techsmith’s Camtasia, Snagit and the free Jing with their associated Screencast publishing) and the ease of production of talking head videos with a laptop or tablet, publishing to Youtube or a dedicated web-storage facility or school learning management platform make it much easier than it used to be for teachers to make material available to their own and other learners and colleagues. In addition, material produced by others, both published material such as that produced to accompany text books or dictionaries or by actors such as the BBC, or the British Council, Instituto Cervantes, Confucius Institute, Goethe-Institut etc. as well as that produced and shared online by other language teachers can be set as pre-class viewing for learners.

The advantages of using web-based material are several. Firstly it is not transient, like material traditionally presented in a classroom or lecture hall where a moment’s distraction can lead to the loss of a crucial piece of information. The material can be viewed again and again, in its entirety or partially until the learner is satisfied. This is particularly useful for material in the target language where the meaning might not be caught on first exposure, or when repeated access can enable learners to focus separately on meaning and form. The material can be revisited, for example before a test or at the point of need, when the learner is trying to recall a particular piece of information. Additionally, the material can be made available at any time of day or night, during the week or at weekends. Learners can access the material when it suits them, arrange their viewing around their other commitments and activities and revisit the material several times if they want. This also means that learners can involve their family and friends in their learning, for support and for extra engagement with the material. Secondly, the material can be reused, so the teacher does not have to reproduce it the subsequent year, but can simply check for currency and link

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it to the learners. The time saved in this way can justify the time it takes to produce the material and to enable teachers to add to their library of web-based materials. Thirdly, if some care is taken to avoid very specific reference to the course and learners who are expected to be the primary users, the material can be repurposed, so that it can be used for learners or activities or courses other than those that were originally intended.

**Technology-Enhanced Language Learning**

If we consider Nation’s (2007) four strands of meaning-focused input, meaning-focused output, language-focused learning and fluency development, it is fairly obvious that technology available to teachers and learners can be a great resource on all four strands. Meaning focused input produced for language learners or a general audience is available with audio (see e.g. Alm 2013), video and text material, at different levels of complexity and aimed at a range of ages and interests. The kind of teacher-produced material mentioned above can be another source of meaning focused input. As more and more of our daily communication happens with the aid of some kind of digital equipment, the potential for technology-mediated meaning focused output for learners is clear. This can mean anything from using voice mail or presentation software to producing films, books and audio for a wider audience. Language-focused learning, whether the subject if directed or incidental focus on form, can be enhanced and individualized to the point of need with the application of the kind of web-based material mentioned above. The internet offers the possibility of real contact between individual learners and between learners and other language users, to offer the kind of real meeting and real communication need that is a prerequisite for fluency development. So, what this means from the point of view of language teacher education is that teacher students need to be familiar with the affordances and constraints of a range of digital tools to allow them to offer their learners a range of activities on all four strands. Teachers need to know about what is available, and to know how to harness the potential of technology-enhanced language education. Teacher education must be able to offer students the possibility of developing this knowledge and these skills.

**Keeping up with and leading new developments**

For almost 50 years since it was first formulated in 1965, Moore’s law (Moore 1965) has held. It predicts that computing hardware will get twice as good and twice as fast about every two years. This suggests that the rapid development in the advance of technology that we have experienced will continue. Meanwhile, myriads of language teachers around the world are developing tools and practices to enhance language learning and teaching. Graduating language teachers will, hopefully, be up-to-date with a range of technology currently in schools and the knowledge and skills that will allow them to use this technology for a range of teaching activities. This is clearly only the beginning. These new teachers and their colleagues in schools need to have access to professional development that will allow them both to keep up with what other practitioners are doing and to lead new developments in technology-enhanced language learning and teaching. Any funding for technology in education that is put into schools needs to allow for this professional development.

**Sharing**

As cloud computing becomes more available and more widely understood, this would seem to be the easiest way for teachers to make their work available to students and to the wider community of language educators. Similarly students can be encouraged to publish their work to allow others to access it. The NZ Internet survey material (Gibson et al 2013) found that just over a third of internet users use the cloud and that the main reason people do not use the cloud is because they do not know how (45%).

The reluctance felt by some educators to share their work with other teachers is hopefully decreasing at the same rate as teachers are discovering useful materials and activities created by other educators. Creative Commons NZ is currently touring the country trying to inform teachers about the benefits of creating shareable attributed content and bringing schools on board to give teachers the right to share their material (McGregor 2014).

Sharing resources is not an essential part of flipped classroom pedagogy, but it does make a natural follow on to the successful development and use of materials by teachers. Teacher education needs to help teachers be aware of the advantages and risks associated with using materials generated by other educators and with sharing their own intellectual property generously but still asserting their ownership and rights. Digital language teachers know how to
use technology to enhance language learning, they have the knowledge and skills to build on the work of others and the technical and social competence needed to share their work so others can refine and further their thinking. Language teacher education has its work cut out.

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Future Focussed Teacher Education:
Why we Need to Inspire with Digital Technologies

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Abstract: The paper introduces the background to information technology and initial teacher education and need for this international symposium in the Asia Pacific region with the support of the international Society of IT and the Teacher Education (SITE) and the Federation of Aotearoa New Zealand (TEFANZ). It aims to explore and collate future focussed research and practices in order to help inform the rapid development of digital technologies in education, locally, nationally and internationally. The topic of digital technologies in initial teacher education is particularly relevant in New Zealand at a time when access to digital technologies is increasing nationwide through Ultrafast Broadband and a national ‘Network for Learning’ that aims to increase international networking and promote more innovative approaches and networked learning. The paper concludes with the author’s call to action that started in 2011, which is met in part by this international symposium.

Purpose

The paper introduces the need for this international symposium in the Asia Pacific region that has aims to explore and collate future focussed research and practices, in order to help inform the rapid development of digital technologies in education, locally, nationally and internationally. The symposium will provide an opportunity for educators and policy makers from throughout New Zealand, the region and internationally to learn from keynote speakers and other presenters, and discuss with colleagues, issues relating to the inspiring use of digital technologies in teacher education, in schools and in their partnerships. We have purposefully invited Dorothy Burt, an Apple Distinguished Educator and Google Certified Teacher, to begin with a future focus for initial teacher education. She will be drawing on her role as eLearning team leader at Point England School and facilitator of the Manaiakalani cluster in Auckland. Point England has been a beacon for equitable future focused schooling in Aotearoa New Zealand for over a decade. Dorothy is keen to help us assist initial teacher education onto the path of future focused education inspired through digital technologies, as a vision that is beyond the aspiration of 21st century skills.

The topic of digital technologies in initial teacher education is particularly relevant in New Zealand at a time when access to digital technologies is increasing nationwide through Ultrafast Broadband and a national ‘Network for Learning’ that aims to increase international networking and promote more innovative approaches to learning. The future focus in this country has been developed by the New Zealand Council of Educational Research for the Ministry of Education (see Bolsted 2011). A previous paper requested by the Ministry of Education’s Governance Board of the Ultrafast Broadband in Schools (UFBiS) (Davis 2011-3) signalled the need for initial teacher education to have access to the Network for Learning (N4L) and benefits that could flow from that access.

The symposium is sponsored by our key national and international associations for teacher education. This international symposium is held as a regional conference of the International Society of Information Technology in Teacher Education (SITE) in association with the Teacher Education Forum of Aotearoa New Zealand (TEFANZ). The renewal of the educational system in Christchurch provides an excellent opportunity for the development of future-focused, modern learning environments and networked schools. The symposium aims to raise awareness of the related challenges that initial teacher education is experiencing as it attempts to keep in step with schools and the consequent need for action, which is supported by its sponsoring organisations SITE, TEFANZ and DEANZ. The symposium aims to explore and collate future focussed research and practices, in order to help inform the rapid development of digital technologies in education, locally, nationally and internationally.
Initial teacher education and digital technologies

Davis (2010) presents the overview of technology and pre-service teacher education in the most recent international encyclopaedia of education. This has been used to provide the context for readers who have not considered the complementary and overlapping goals of embedding ICT in teacher education. "(1) preparing teachers to use ICTs in educationally effective ways; (2) preparing K-12 teachers to teach ICT related content; and (3) applying ICTs to serve teacher education. In essence technology is a cross-curricular theme, a content area, and a tool that can be applied to learning and teaching, which includes the use of telecommunications to improve access to education." (Davis, 2010: 217)

The complex challenges of school renewal and teacher educator professional development are intensified in teacher education. Many teacher education programmes work synergistically with school partners so that student teachers can bring new knowledge and skills into their classrooms and schools, which results in significant curriculum and professional development within partner schools which is a major theme within the two consultation papers requested by the Ministry of Education in 2012 (Timperley 2012; Aitken et al. 2012). John Goodlad (1994) recognised this when he spoke of the need for ‘simultaneous renewal’ of teacher education and school education, stating “one cannot change without the other”.

Thus innovative initial teacher education programmes can impact schools through simultaneous renewal alongside schools but it will never be easy, as briefly outlined in the same encyclopaedia entry: " This final section reviews four issues in technology and teacher education: faculty and organizational development and related national initiatives, equitable access to technology and teacher education, and the challenge of researching this field. Faculty and organizational development have been and will remain a major challenge worldwide because technology and education continue to evolve. ICTs are best viewed as clusters of innovation that are adopted and/or rejected by individuals and organizations in stages. For example, as described earlier, best practice in the preparation of pre-service teachers to use an interactive whiteboard in a high school classroom includes adoption of new hardware, software, and procedures in the pre-service program by faculty with the support of staff and administrators, along with similar adoption in the school where pre-service teachers practice. Goodlad (1994) described the link between the development of colleges and K-12 schools as simultaneous renewal to emphasize that one could not come before the other; both must develop together. The adoption of each cluster of innovation takes place in stages and the speed of adoption is related to the concerns of each organization and individual with related development of Technology Pedagogic Content Knowledge (TPCK; ) and resources (Davis 2008). In the eclectic range of strategies used to promote effective practice with technology in pre-service teacher education, technology mentoring is one of the most successful strategies because it takes individual faculty concerns as a starting point and provides one-on-one support from a student who also gains knowledge of educational practice (Thompson et al., 2007).” (Davis 2010: 220)

In 2011 the author noted “Over the last decade there has been a range of development with the application of ICT, such as blended online learning in the University of Canterbury (Hunt et al. 2011), blended learning in Massey University ITE programme (Kehrwald et al. 2011; Simpson 2008) and twitter in a University of Waikato programme (Wright 2010).” (Davis 2011-3) A particularly challenging activity is that of preparing for and taking part in school experience and practice teaching, during which beginning teachers need access to school infrastructure and encouragement from cooperating school teachers and administrators. The symposium will exhibit a range of examples where this collaboration in the preparation of future teachers also benefits school renewal.

Similar challenges in the UK, USA and South America have been recognised and they have been targeted with national initiatives that started in England with project INTENT in which the author led the integration of IT in initial teacher education in the University of Exeter and collaborated with the national coordinator to edit a book with a selection of the research outcomes (Somekh & Davis 1997). In the USA the nationwide programme was called Preparing Tomorrow’s Teachers to use Technology (PT3); and in South America the Enlaces initiative started in Chile led by Enrique Hinenstrosa. The most recent nationwide initiative was in Australia (Albion 2014). However, it should be noted that New Zealand has not funded a national initiative to support such ‘simultaneous renewal’ to match the support provided to schools.
Future focused initial teacher education in New Zealand

During 2012 the Ministry of Education commissioned two papers that were intended to be bold and to form the basis of discussion and consultation on the professional preparation of teachers for schools in New Zealand (Aitkin et al 2012; Timperley 2012). Together they presented a world-leading view of initial teacher education that “could begin to transform the profession... To put this view into practice, a great deal of further unpacking about what it means in practice and the development of new models will be required. To implement this process will require commitment and energy from all involved in the interests of addressing the issues of equity and quality outlined in the Ministry of Education’s introduction to these papers.” (Timperley 2012) These papers also provide an excellent and timely overview for this outline of additional strategies that are necessary to accompany the nationwide implementation of Ultrafast Broadband for the economic benefits foreseen by the Government’s multibillion dollar investment.

In her thought provoking discussion of research into the challenges of learning to teach, Helen Timperley tabulated the shifts that a novice starting an ITE programme must make in order to become teacher who is an adaptive expert ready to undertake the mission foreseen for teachers by the current Government for New Zealand schools. In addition to a shift of “focus on self to a focus on students”, a shift “from simplicity to complexity” is also necessary. That shift includes a shift of perspective on the “location of learning”:

- From “Learning happens primarily in the classrooms. Other environments, such as home, get children ready for schooling.”
- To “Learning draws on information from multiple environments, including digital. “Schooling” involves developing educationally powerful connections across them that assume the importance of an integrated approach to learning within and beyond classroom walls.” (Timperley 2012: 10)

The location for learning includes digital environments such as the Network for Learning. In the final principle 5 “Situate learning in carefully constructed learning communities”, Timperley notes: “Given the importance of the social context in shaping what is learned, it is essential that a broader view than schools is taken of what constitutes relevant communities when learning to teach. Not all learning happens in school or a university. Indeed many suggest that most learning happens outside of formal institutions including the digital environment, and so the very idea of experiences related to learning to practice should have a wider reach.” Timperley also noted that social networking technologies are an increasingly powerful medium for educators and related professional development.

These papers have informed the innovative pilot Masters’ programmes for initial teacher education in New Zealand, which will be accompanied by research of each pilot programme and nationwide evaluation. “The establishment of a small number of exemplary programmes will provide the opportunity to demonstrate exemplary practice, identify the strengths of new approaches and build the national knowledge base about the system conditions needed to support the wider introduction of new postgraduate ITE qualifications.” (Ministry of Education 2013) The University of Canterbury exemplary pilot programme, which will prepare approximately 60 new teachers each year from 2015, will include a future focus in collaboration with Canterbury teachers supported with extensive application of digital technologies and a research plan that recognises indigenous methodologies essential in this bi-cultural nation and valuable worldwide (Davis & Fickel 2014).

Conclusion and Call for Action

The paper to UFfBiS Governance Board in 2011 was followed by a national enquiry led by Minster Kaye (Education and Science Select Committee 2012) and the enquiry heard the recommendations made by the author in 2011, and noted some sympathy in a subsequent meeting in 2013. Therefore Davis’ (2011-3) white paper ended in this way with a set of three recommendations:

“This paper aims to guide implementation and development of education in New Zealand with the Network for Learning (N4L) and Ultrafast Broadband in Schools (UFfBiS) with particular reference to teacher preparation. Many educators will be unable to access the nation’s Network for Learning unless action is taken to ensure the coherence of policy so that relevant educators in the tertiary sector can engage with the schooling sector. This is particularly critical for initial teacher

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education. This paper is seeking comment and/or support for three recommendations:

1. The services of the Network for Learning N4L Crown Entity be adjusted to cover all those who work in the schooling sector. This could be done by Ministry of Education through the joint Memorandum of Understanding so that existing funding is linked to access to the services of the Network for Learning is enabled for student teachers and tertiary staff working with initial teacher education. (Note: This would not include any subsidy for bandwidth services because they are only relevant for school premises).

2. A national hui be urgently convened to better understand and start to disseminate the contributions and needs of initial teacher education, including services such as nationwide ePortfolio services that are already deployed for schools and professional learning development (PLD) in the schooling sector.

3. The government’s billion dollar investment in UFB be leveraged by gathering relevant illustrations of best practices plus related research and development to inform the national strategy and all relevant educational agencies and institutions. Best practice includes PLD provided by student teachers and curriculum innovations with digital technologies that reach schools and communities through ITE, including blended online learning across initial teacher education and some partner schools.”

This international symposium instigated by the profession is the national hui meeting called for in the second recommendation, now an international meeting that will include presentations from most if not all the providers in New Zealand complemented with international perspectives and the views of leading school educators such as Dorothy Burt. The proceedings and later research into New Zealand’s pilot programmes in postgraduate initial teacher education could be leveraged to answer recommendation 3.

We continue to await an answer for initial teacher education regarding access to the Network for Learning.

Postscript

Following the symposium there was increased appreciation of the place of initial teacher education in New Zealand schools. As a result, with support from key leaders in the Ministry of Education and the Network for Learning, the process of enrolling and related curriculum and organisational development is underway.

References


SITE International Symposium: Future Focussed Teacher Education 28-29 April 2014
University of Canterbury, Christchurch, New Zealand


Using Technology Enabled Feedback in Initial Teacher Education

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Abstract: Formal assessment tasks such as assignments and exams, within the typical teaching and learning model in university settings, enable summative judgments to be made about students’ level of learning. Less common is the use of assessment to provide the kind of formative feedback that helps lecturers support and guide students’ learning, and less common still is feedback on learning from the students to the lecturer. This paper presents six case studies highlighting how mobile technologies and Web 2.0 applications can be leveraged to facilitate feedback from students and teachers. As lecturers, our use of this feedback exemplifies pedagogies that emphasise active participation in meaningful communities of learning and inquiry.

Introduction

Traditional tertiary classroom environments have predominantly provided spaces catering for a didactic or transmission form of teaching. In transmission pedagogy teaching is viewed as a process of effectively conveying ideas and information to students (Jonassen & Land 2000). In terms of teacher education, the assumption is made that because the teacher educator has been teaching for longer, the teacher educator understands teaching better and is more capable of communicating the key information to neophytes of the profession. Learning in this pedagogy is viewed as a process of knowledge acquisition. Epistemologically, this pedagogy assumes that knowledge about teaching can be distilled from the context of teaching, refined and taught to learners as though it was an object that is capable of being passed around (Britzman 1991). This further assumes that the learner can come to know the world as the teacher does and presupposes that the learner wants to know the world as the teacher does (Ovens & Garbett 2012).

In the case of teacher education, this transmission pedagogy emerges in two dominant forms (Myers 2002). The first is based around the traditional lecture, where the pedagogy enacted is one of “telling” students the key information they are expected to learn. This approach is supported by lecture theatres and classrooms that are furnished and equipped so that the student’s gaze and attention is focused on a ‘teaching wall’ at the front of the room and where the teaching lectern and lecturer are located. Classroom design of this nature is not easily conducive to other
pedagogical approaches and inhibits the potential for active learning and collaboration among students. The second form is based around modelling good practice, where the pedagogy enacted is ‘demonstrating’ to students the key information they are expected to learn. This approach is supported by classrooms that simulate school classrooms and allow the lecturer to show, or model, particular teaching ideas. These pedagogical forms are often used interchangeably throughout a course. In our view, both are flawed and are based on the same set of epistemological and ontological assumptions that view teaching as a process of knowledge transmission.

The desire to shift away from transmission pedagogies draws on new understandings from a range of different disciplinary areas about how teachers learn and develop their teaching. For example, constructivists have stressed the importance of seeing learning as an active process of interpreting new knowledge and experience in light of their past experiences and recognising the influence of existing beliefs to modify and shape learning (Beck & Kosnick 2006; Tillema & Knol 1997). In particular, constructivism promotes the ideas that learning is most effective when it is based on students’ own experiences, and learning is less effective when the learner is expected to passively absorb information or knowledge given to them by others (Beck & Kosnick 2006). Sociocultural theories have focussed attention on the situated nature of settings in which people learn and how these enable and constrain learning as a function of working competently with the practices of that setting (Greene 2006; Lave & Wenger 1991; Putnam & Borko 2000). Phenomenological studies have focussed on the embodied, experiential and complex nature of learning to teach and the mediating effect biography, discourse, personal learning networks and identity have on shaping the individual trajectories students take in teacher education programmes (Atkinson 2004; Ovens & Tinning 2009).

Collectively, the contribution from these multiple perspectives has been to challenge forms of pedagogy oriented towards knowledge transmission and acquisition, and explore forms of pedagogy that are oriented around active participation in meaningful communities of learning and inquiry. Such a shift places increased attention on enabling student teachers to engage meaningfully and authentically in situations that allow the knowledge, skills and dispositions that underpin quality teaching to emerge in forms of deliberate practice. It also draws attention to the way learning is an open and social process where students, as active contributors in that process, engage the material, social and human capital necessary for enhancing the experience and the potential for learning (Barab & Roth 2006). Moving beyond transmission forms of pedagogy is supported by classrooms that enable students to be active participants interacting and connecting with learning networks both within and extended beyond the boundaries of the classroom. In terms of this project, such an approach also draws attention to the way technology can afford opportunities to facilitate connections and flow of information that can enhance feedback to the teacher and learner that enable learning to be more emergent than more conventional teaching approaches.

Enabling effective forms of feedback is essential to enhancing the learning of students. Within the typical teaching and learning model in university settings, formal assessment tasks such as assignments and exams, enable summative judgments to be made about students’ level of attainment. Less common is the use of assessment to provide the kind of formative feedback that helps lecturers support and guide students’ learning, and less common still is feedback on learning from the students to the lecturer. The traditional flow of feedback information from the lecturer to the student in effect influences the student to adapt to the pedagogy of the lecturer. The alternative of also seeing feedback as flowing the other way, from the student to the lecturer, allows the pedagogy of the lecturer to adapt to the needs of the student. Such student to lecturer assessment information could enable the lecturer to more effectively respond and adapt to the learning needs of the student.

In his synthesis of some 800 meta-analyses of 52,637 individual quantitative studies Hattie (2009) concluded that the three strongest single factors impacting student achievement are self-reported grades, Piagetian programmes, and providing formative feedback. On feedback he notes, “What is most important is that teaching is visible to the student and that the learning is visible to the teacher” (p. 25). In this sense, feedback needs to provide information specifically relating to the task or process of learning that fills a gap between what is understood and what is aimed to be understood (Sadler 2004). This can be through affective processes, such as increased effort, motivation or engagement, or through a number of different cognitive processes, including restructuring understanding, confirming to students that they are correct or incorrect, indicating that more information is available or needed, pointing to directions students could pursue, and/or indicating alternative strategies to understand particular information. Winne and Butler (1994) posit that “feedback is information with which a learner can confirm, add to, overwrite, tune, or restructure information in memory, whether that information is domain knowledge, metacognitive knowledge, beliefs about self and tasks, or cognitive tactics and strategies” (p. 5740).
Providing such feedback in traditional tertiary education settings can be problematic however, particularly given the large size of classes and the short duration of courses. Technology demonstrates a potential to overcome this problem and provide forms of video-, audio-, or computer assisted instructional feedback that can support student learning in relation to the goals of the course (Hattie 2009). This paper presents a series of brief case studies where a range of tertiary educators have explored going beyond transmission teaching by using technology to facilitate feedback in initial teacher education.

**Context and description of the project**

This project is part of Faculty-wide initiatives to promote the use of technology and also use large interactive teaching spaces to teach some large groups (50+). A group of lecturers in teacher education in the Faculty of Education used a Learning Enhancement Grant as an opportunity to explore how the use of mobile technologies could make feedback about learning visible to students and lecturers. The project employed the idea of a professional learning community (Alton-Lee 2003) to frame the way the teacher educators worked together to use technology in their teaching to make learning visible. The advantage of thinking of ourselves as a learning community was that it respected the knowledge that each person brought to the project regardless of expertise in using technology for teaching. Inquiry and professional learning were critical in this approach and to facilitate this, each teacher educator developed an individual inquiry into their own teaching. Use of the technologies was supported by the Centre for the Creative Application of Technology in Education (CreATE), a Faculty of Education centre. With technical assistance from CreATE staff, lecturers trialled different applications that suited their pedagogical needs, particularly in the large class interactive teaching spaces. The members of the group acted as ‘critical friends’ for each other through workshops, meetings and peer observations of teaching. In this way, one outcome of the project was a series of individual case studies of the receptivity and innovation of each individual’s use of technology. A second outcome of the project was the analysis of the collective experiences of the group in exploring how technology can enable emergent forms of pedagogy beyond transmission. Regular meetings allowed us to share our individual experiences and engage in a collective analysis of these.

The project itself was divided into three phases. Phase one focused on building the learning community, as this was central to the idea that we wished to ‘research with’ colleagues rather than do ‘research on’ teaching. We sought to work with others who were willing to actively inquire into their own practice. The second phase of the project involved supporting one another to explore how technology could facilitate making students’ learning visible in our teacher education courses. As part of our inquiries, we collated evidence of our experiences with technology as it related to the pedagogical and content issues we encountered. Evidence collected and reflected on by the group could include lesson plans, teaching resources, examples of students’ work, peer observations, or student evaluations. In addition, focussed writing tasks enabled participants to elicit and more closely explore aspects of our on-going experiences. The final phase of the project involved evaluating the key outcomes of the study. This involved both collective and individual meetings. For this paper, we share our experience involving the use of technology to make students’ feedback/learning visible.

**The teaching/learning spaces**

In the past few years an increasing number of academic publications have highlighted the crucial role that learning space design can play in promoting those skill sets that are increasingly desired among our graduating students (Salter, Thomson, Fox, & Lam 2013; Brooks 2011; Brown & Long 2006; Oblinger 2006). In step with research in the area of collaborative learning, has been an increase in the capability and accessibility of mobile devices and wireless technology along with a corresponding decrease in cost of ownership. Of great interest to us are the recent findings that these collaborative learning classrooms can have positive impacts on student learning outcomes (Keppell, Souter & Riddle 2012), including: enhanced student and lecturer interaction (Jamieson, Dane, & Lippman 2005); enhanced active, collaborative and cooperative learning among students (Beichner et al 2007; Dori & Belcher 2005; Taylor 2009); enhanced social engagement among students (National Learning Infrastructure Initiative 2004); improved students’ problem-solving abilities (Taylor 2009); and improved students’ attitudes and interest in the subject matter (Beichner et al 2007; Dori & Belcher 2005).

The Faculty of Education commenced teaching in new technology-rich, Collaborative, Active Learning Spaces (CALS) in February 2013. Each CALS environment is equipped with a traditional teaching lectern, room computer, data projector and wireless network access. In addition, there are five flat screen monitors, two Apple TV units and a
set of thirty tablet computers. These spaces can support a total of sixty students grouped six per hexagonal table with ten tables per space. These rooms have provided the opportunity for changes in teaching practice with large groups and importantly some significant changes in the learning experience of both staff and students (Leichtweis et al 2013). These rooms were used in some of the following case studies. Each of the case studies highlights possibilities for visible, immediate feedback using mobile technologies.

Case Studies

The following case studies are organised according to the timeframe in which the lecturers used the students’ feedback to inform their pedagogical decisions.

Case Studies 1 & 2: Using feedback during teaching sessions

Large lecture theatres are particularly conducive to producing passive students whose only engagement appears to be supplementing the notes they have downloaded in advance from the course’s learning management system. Of course, it is possible to foster a more active class if situations are arranged where students work in pairs or small groups to discuss a particular problem or question. However, feeding back from such discussions can be difficult given the overly public nature of lecture theatres. Responding in such situations becomes the domain of the more confident student. It was for this reason that Alan initially explored alternative ways of being able to interact with his Physical Education student teachers and create opportunities for more dialogue. Socrative, (www.socrative.com) a student-response platform provided a means to achieve this. By downloading the Socrative app, students could then participate in activities that Alan set up as the lecturer and could do so anonymously. Students engaged through any mobile device they brought to class, including their smart phones, tablets and lap-tops.

The advantage of using Socrative in a class is the way it enabled interaction to be both visible and anonymous. As the lecturer, Alan could pose a question for students to discuss. They responded with an answer which was added to the other answers being submitted and shown on the theatre screen. Students could see the responses from people but not the names of those writing the responses. This list could then be used to stimulate further discussion, shape the next step of instruction, be refined through an inbuilt voting system, or saved for future reference. Alan has also selected the list and pasted it into a word-cloud programme like Wordle (www.wordle.com) to provide a visual representation of the responses.

In a very important sense, Socrative made the lesson with a large number of students more interactive. By building in regular opportunities for students to respond to questions, take quizzes, or provide end-of-lesson feedback to the lecturer, the lesson became more dynamic and responsive to the students’ learning activity. Levels of engagement and understanding were quickly surveyed and decisions made about what to do next.

The second case study involved Graduate Diploma (Primary Specialisation) science education classes with lectures of 180 students and practical workshops of approximately 60 students in an interactive CALS. In previous research with science education classes, when the classes averaged around 37 students, feedback from students and lecturers was generated throughout the course by developing a back-channel in each session where the students could answer questions, post their own questions or make comments, synchronously as the session was progressing (Heap 2011, 2013). The Web 2.0 platform Piazza (https://piazza.com) was found to be a particularly effective platform for this, with its near instant refresh rate which allowed student comments to be seen by all on the data-projection screen and/or flat screen monitors as well as the students’ own devices. This enabled feedback to become multidirectional: from the student to the lecturer; from the lecturer to the students; and from the students to each other.

However, in the larger science education classes of this LEG project, the string of student posts was lengthy and cumbersome so a simpler means of generating this same level of feedback was required. To this end the online web application GoSoapBox (http://www.gosapbox.com) was used to encourage student participation and provide feedback on student learning throughout each session. As a very similar platform to Socrative in Case Study 1, GoSoapBox was used primarily to create polls and quizzes. Since it provides real-time poll results in graphic form, feedback was instant for the students and for the lecturers. A ‘confusion barometer’ where students clicked their screen provided on-going feedback to the lecturer. Students could also use GoSoapBox to ask, and respond to, questions during class sessions and vote for questions that they wanted to be addressed. They responded via their computer, smartphone, or tablet and all interaction was anonymous in the class displays.
Each of these uses of this technology provided feedback to Rena as the lecturer and enabled her to respond immediately when appropriate. Rather than needing, as previously, to rely for feedback solely on the few ‘barometer students’ of the classes, she was able to also use feedback on student learning from the polls, quizzes and questions the students posted. This immediacy addresses Nuthall’s (2007) criticism that the teacher is “largely cut off from information about what individual students are learning. Teachers depend on the responses of a small number of key students as indicators and remain ignorant of what most of the class knows and understands” (pp. 919–920).

In a midsemester evaluation more than 80% of the students considered that GoSoapBox always/almost always improved their attention, and fostered participation. The technology interface itself was considered by over 98% of the students to be easy to use, especially its quick refresh rate that enabled the posts of others to appear on screen almost instantly. Of particular interest concerning the technology is that 90% of the students did not consider technology to be a hindrance to interaction, which was a contrast to the use of Piazza that some students did find problematic in the larger classes. This technology-enhanced feedback provided an ongoing window for the lecturer into student learning.

**Case Study 3: Using feedback at the end of a session**

Shiree’s participation in this project involved the use of the Educreations ([www.educreations.com](http://www.educreations.com)) Web 2.0 tool to provide feedback on the learning occurring within the lectures in a second year early childhood teacher education mathematics course. Traditionally this course had been delivered in a didactic format with the lecturer delivering content and students taking notes or performing tangible tasks to build content knowledge (Lee, 2010) It was Shiree’s intent to make some shifts in the delivery of this course to enhance the visibility of learning about early childhood mathematics and to enable feedback to be provided by the students on the key points they were learning. Underpinning the changes to the course delivery was also her desire to include aspects of ‘Ako’; effective and reciprocal teaching and learning for, and with, learners (Pere 1982) and to increase the collaborative approaches to the use of Web 2.0 tools in the tertiary education classroom.

In each session, two selected students acted as ‘digital reporters’ using their iPads through the session to gather the key points, chosen by the students, of the lectures and classes and then feeding this back to the whole group at the conclusion of each session. The content of the class was presented using the interactive whiteboard, image recording and voice commentary functionality of the Educreations application. These recordings were then saved for future viewing. In terms of pedagogical approaches this course shifted from the didactic model to a more student-centred model. The digital reporters recorded more detail regarding what students were engaging in, noting and considering, than was previously available and the lecturer was able to shift the focus and depth of the teaching in subsequent sessions as a result of the reports provided. The digital reporters’ views of the class provided Shiree with feedback into what the students saw as the main points of each class and what the students themselves thought of as important. This prompted her to reflect on the content and delivery of each class as it was being recorded and played back and to modify the future content of the course as informed by students’ responses and ideas.

At the conclusion of the course, formal student evaluation showed that for most the digital reporter process in the class had been enjoyable and useful. Some students stated that they did not like performing the role themselves as they did not have as many personal lecture notes as they would usually, but others stated that the copies of each of the digital reports were useful as study notes after each session. The use of technology provided feedback of which Shiree had not previously been cognisant.

**Case study 4: Feedback during and after sessions**

Constanza’s participation in this project coincided with the introduction of a number of Web 2.0 tools in the Learning Languages in Schools practical course offered to the Secondary Graduate students of languages. She incorporated a range of Web 2.0 tools during the delivery of the course in 2013 with the aims of improving the IT literacy of the student teachers as well as demonstrating the pedagogical possibilities afforded by the integration of technology in their own language classes.

Technology has been present in the teaching of languages since the 1970s. However, although student teachers often arrive to the Graduate Diploma with little exposure to the pedagogical possibilities of technology to the teaching of languages (An, Wilder, & Lim 2011), they are expected to effectively and meaningfully embed technology within...
their pedagogical practices (Cakir 2013). This requires a thorough understanding of the roles and affordances of technology in language education settings (Tolosa, East, & Villers 2013). Furthermore, the use of Web 2.0 tools in language education has been growing over the last years, yet initial teacher education has been slow in exploring the possibilities that such technologies provide to enhance language teachers’ knowledge of the language and knowledge of pedagogy.

During 2013 the student teachers were introduced to a number of Web 2.0 tools to teach languages. One of the tools introduced early into the course was Padlet (www.padlet.com), which is a user-friendly online application in the form of a wall where students can post any content (text, images, video, links) from any device on a topic of choice. Throughout the semester, Constanza used Padlet to receive feedback from the students by collecting information on their understanding of a lecture (similar to an exit-slip), gathering resources for class activities, or summarising students’ opinions on different topics. The fact that the whole group used these walls created a sense of a safe community where they could provide individual feedback to the lecturer and see what others were sharing. Since they had the iPads in the room, feedback collected via Padlet was immediate and the lecturer reviewed it after the session in preparation for the following one.

A feature of this course is that Constanza teaches students across six languages and she needs to create the conditions for them to use the languages meaningfully in class. Therefore, one valuable application of Padlet was to create language groups where students collaborated on different tasks, had the opportunity to use the language authentically, interacted with their language-specific tutor and provided and received feedback on the development of activities. One of the assessment tasks at the end of the semester required the students to develop a teaching resource which had been trialled with at least two peers of their same language and where they demonstrated seeking and providing feedback about the linguistic and pedagogic purposes of the activity.

Feedback collected from the students at the end of the course was mostly positive about the use of the Web 2.0 tools. Some of the students commented that the last assignment (with technology) was the most enjoyable and practical. A few students were resistant to having their work available to others for feedback, but liked the opportunity to explore different Web 2.0 tools. For Constanza as a lecturer, the constant feedback collected from the students via Padlet and other tools, was most valuable because it allowed her to make adjustments on her teaching from lecture to lecture with data received from the students.

**Case Study 5: Students working outside of the session**

The use of feedback in movement contexts is well embedded in physical education pedagogy. Traditionally, physical education teachers have used observation and video to inform, reinforce and motivate improvement in performance. Taking this practice further, Margot used the concept of the Flipped Classroom (Tucker 2012) to make feedback on student learning more visible to her students. Her intention was to motivate them to disrupt what she had previously described as an overemphasis on theory-based lessons and large written assessment workloads and the apparent devaluing of practical learning and rich learning movement experiences in senior physical education as offered in the Curriculum (Bowes 2010). Green (2001) describes this as the ‘academicisation’ of physical education or the demise of practical physical education, substituting embodied learning for theoretical or ‘academic work’ to enhance the status and legitimization of physical education.

The Flipped Classroom can take a number of formats, however for this case study Margot focused on teacher made content instructional videos that could be accessed by her physical education student teachers from home prior to their session. This freed more time for collaborative, problem-based interactive learning opportunities in class. Students created four to six minute videos on skill analysis content essential for biomechanical analysis of movement. Using Educreations student teachers made ‘flipped’ lessons that they shared using a large interactive screen in one of the gymnasiums. Students gave feedback to each other on their lessons. Based on the feedback they received from their peers, the student teachers then refined their lessons for use with their future students. Margot emailed students voice files to make feedback on their learning more visible by explaining in detail what they had done well (feedback), how the flipped classroom lesson might be improved and most importantly the next steps in their learning as teachers (feed forward).

In this case study, using the concept of the Flipped Classroom and the web-based tool Educreations highlighted a number of both teacher education and secondary teaching affordances. For teacher education the visual and auditory
feedback afforded by Educreations made feedback more accessible and more visible. The students reported increased engagement in lectures and improved feedback using verbal assessment. For Margot as the lecturer, the verbal feedback was more specific and took less time than providing written feedback. The use of digital tools enhances their digital capability amidst increased expectation that they are digitally literate graduates.

Case Study 6: Feedback across a semester

Dawn’s previous research (Garbett 2007, 2011, 2014) has focused on ensuring early childhood student teachers have the confidence and competence to teach young children science. Because the early childhood curriculum is an emergent one, the teacher’s role is as a supportive knowledgeable other. The teacher follows the child’s lead through play but they need to be proactive when scaffolding children’s learning and to know how to maximise learning opportunities (Ministry of Education 1996).

For their e-portfolios in an early childhood science methods course student teachers were required to take photographs in each of six workshop sessions and to write a description of their learning in order to demonstrate the Graduating Teacher Standards. They were asked to store this on any e-portfolio platform of their choice. The majority of students found WordPress (www.wordpress.com) suited their needs and skill level. Some used Tumblr (www.tumblr.com) to good effect to document their learning experiences. General feedback on their work was given each fortnight while individual feedback was made on some of the portfolios. A general comment was put on the learning management system as an announcement to the whole cohort highlighting particularly good examples and drawing attention to common pitfalls.

E-portfolios enabled students to demonstrate what they had learned. It became a record of the new content and skills we explored in the sessions. Providing regular feedback encouraged and motivated students to attend each workshop session and to engage in science activities. Furthermore, because students were also required to go on-line in their own time and find an interactive clip that could enhance their learning or would be appropriate for children’s learning in the future, the task encouraged them to become savvy, independent learners who could maximise the potential of technology. E-portfolios therefore provided instances of assessment of, for and as learning.

In an end-of-course evaluation, 32/37 ECE students (86.5%) thought they had learnt content through e-portfolios (cf. 79% exams; 75% prescribed readings; 95% lectures; 100% workshops). Many students commented positively on the use of e-portfolios. For example: “I see reflections as a way to analyse how, what and why children learn as well as analysing my own professional teaching techniques and how to improve them. … it has taught me to use my reflections in practice to be a high standard teacher that is on a continuum of learning” (Student comment, email, 23.8.2013).

One of the most powerful avenues for e-portfolios to enhance learning was the license given to students to own the material they put in their files and to update any information as their opinions changed, or their knowledge deepened. As one of the students said in an email: “What a great idea to update my learning, I wasn't sure if I could be changing an assignment but I would love to” (Student comment, email, 23.8.2013).

E-portfolios continue to be the mainstay of the assessment schedule. They have increased the visibility of what the students are learning as they participate in the course - both in and out of class. However the only considerable drawback has been the amount of lecturer time required since students have been free to choose their own platform and security levels. However, the lecturers are committed to allowing them to create a portfolio that they can take when they leave this course (and institution). To put constraints on this runs counter to my expressed aim which is to increase their confidence and competence to teach children through rich science experiences.

Conclusions

These case studies have highlighted how individual lecturers have utilised technology to generate richer feedback about learning than would have previously been possible. The use of mobile technologies does not ensure that we move away from transmission style teaching. However, we have seen that their use can provide a catalyst for significant, powerful shifts in classroom climate, pedagogy and learning (Davis 2003; Ovens, Garbett, Heap, & Tolosa 2014; Ovens, Garbett, & Heap in press). Although we used different tools we each strived to provide
opportunities for increased student engagement, collaboration and interactivity and used their feedback to shape our teaching.

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Acknowledgements

We wish to sincerely acknowledge Warren Patterson and Lawrence May for being instrumental in the work reported here. This project was funded by a University of Auckland Learning Enhancement Grant.
Preparing new teachers for digitally-enabled, future-focused learning environments

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Abstract: New teachers are launching their careers in learning environments that are constantly evolving and a step change to what they themselves experienced as learners. These changes are powered by changing learning space architectures, the ubiquity of digital technologies, a growing emphasis on networked communities and professional learning networks, an understanding of learner agency and significant shifts in the de-privatization of teacher practice. As they incorporate these changes schools are becoming increasingly innovative resulting in wide variation in what classrooms and teaching and learning look like in practice. The complex changes, in many cases, are underpinned by transformative shifts in school culture, the expectations for students to manage their learning more independently, and a more inclusive and genuine effort to engage with students, whānau and teachers in the collaborative development of meaningful learning experiences to improve student outcomes. This presentation will consider the implications for initial teacher education, while also drawing upon our research into the leadership strategies that we are researching in collaboration with principals who are transforming their schools accompanied by increased ICT integration.

Future Focussed

New teachers are launching their careers in learning environments that are constantly evolving and a step change to what they themselves experienced as learners. These changes are powered by changing learning space architectures, the ubiquity of digital technologies, a growing emphasis on networked communities and professional learning networks, an understanding of learner agency and significant shifts in the de-privatization of teacher practice (Dumont, Istance, & Benavides 2010; Levin & Schrum 2010). As they incorporate these changes schools are becoming increasingly innovative resulting in wide variation in what classrooms and teaching and learning look like in practice. The complex changes, in many cases, are underpinned by transformative shifts in school culture, the expectations for students to manage their learning more independently, and a more inclusive and genuine effort to engage with students, whānau and teachers in the collaborative development of meaningful learning experiences to improve student outcomes. Digital technologies are threaded across and within all of these complex strands of change and they impact the way schools, teachers, learners and communities engage with and experience learning. This evolution of schooling is occurring particularly rapidly in Christchurch as the region moves ahead with extensive rebuilding and optimism for the future.

Leadership

Our views are informed by current research about the leadership of schools transformed with digital technologies (Mackey et al. 2013). Within that project we have found Levin and Schrum’s (2013: 53) eight keys to integration of technology to be a valuable framework to interpret what we are seeing. The schools are rapidly turning all eight of the keys:

1. Revise the curriculum to promote 21st century knowledge and skills.
2. Provide ongoing differentiated professional development.
3. Focus on making school culture more collaborative.
4. Identify realistic, sustainable funding sources for technology.
5. Provide good tech support for teachers.
6. Ensure that schools have strong and distributed leadership.
7. Have a clear vision for where technology integration is headed.
8. Forge partnerships with families, universities, and community businesses.

**Initial Teacher Education**

Initial teacher education is also evolving rapidly stimulated by many opportunities and needs. Helen Timperley’s (2012) white paper on ‘adaptive practice’ required today fits well with what we can see in these transforming schools. This is a stage of further maturity on top of the integration of digital technologies that was described in the latest edition of the international encyclopedia of education only four years ago (Davis 2010).

There are at least two key challenges facing initial teacher education providers: firstly, how to continually renew their own understanding and expertise to stay abreast of contemporary, digitally-enabled pedagogies in order to lead effective pre-service programmes; and secondly, how to develop the understanding, confidence, capability and adaptive expertise that new teachers require to work effectively in a digitally-enabled, future-focused, learning environment.

This presentation will explore some of the challenges, opportunities and strategies emerging within the context of rebuilding and transforming education in the Canterbury region, which is being supported by a special course offering for newly clustered schools that are being required to rapidly move into ‘modern learning environments’ or related pedagogies, with the modern learning environment to follow.

**References**


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Abstract: This paper examines the experiences of two lecturers in an early childhood initial teacher education programme, as they navigated and adapted Adobe Connect technology to build reciprocal and responsive relationships with their online students. As noted, it is important that early childhood teachers are able to build and maintain relationships which foster children’s learning and development (Ministry of Education, 1996). The lecturers questioned how they could model building reciprocal and responsive relationships with their online students so that the student’s experiences and learning were enhanced. The findings indicated that students were eager and willing to participate via this technology, had a sense of belonging, engaged with content and built relationships with lecturers and colleagues. Future considerations are noted and include the need for professional development of staff to learn more about the key features of Adobe Connect to facilitate student-led sessions. Exploring the relationship between students’ engagement with course content and how this can be reflected in their professional practices is considered.

The context of our journey

One of the principles of the New Zealand early childhood curriculum Te Whāriki is that “Children learn through responsive and reciprocal relationships with people, places, and things” (Ministry of Education, 1996, p.14). We felt that this would also be true of our students who would be more likely to learn in an environment where they would be able to experience responsive and reciprocal relationships with us and their colleagues. One of the questions that we had when thinking about our distance students was “Have we as lecturers created and modelled this principle with our distance students and what else can we do to enhance their experiences?”

In the initial teacher education programme at the University of Canterbury there is a three year undergraduate degree in early childhood education. The degree can be undertaken either as an on campus student or via a distance option/Flexible learning option (FLO) through blended and online learning. The distance students attend an On Site Intensive (OSI) at the beginning of each semester where they are introduced to the lecturer/s of the course, course content and have opportunities to build relationships with the lecturer/s and other students. Distance learning in ECE has been offered for a number of years. Originally distance students received hard copy module booklets and course readers, this has evolved to students accessing all course materials on line.

Students access materials via the Student Management System “Learn” that is an on line space which according to Hunt et al. (2011, p.3) “has become a one stop shop open 24 hours a day.” We found this access was particularly useful during the earthquakes in 2010 and 2011. It was during these times that we had to find a way to connect with both on campus and distance students. The February 22nd 2011 earthquake struck on the second day of the year one students OSI. We were both ready to present the student’s first University lecture for Professional Inquiry when we were literally shaken off our feet. In the days following we questioned how to continue building relationships with the students which we would have normally begun to establish at the OSI. We found ourselves defaulting back to uploading modules for students on the Learn site. There was little reciprocal interactions with the students, rather the site was used as an information tool and we felt the beginnings of being disconnected from our students. We did
begin hearing from a colleague who had started using ECHO 360 personal captures and we were intrigued by the possibilities of using this tool. However it was not until 2012 that we began to use this technology. At this time the University redeveloped the Bachelor of Teaching and Learning (Early Childhood) undergraduate degree. The new courses provided opportunities to rethink how we connected with our distance students in light of the previous year’s disruptions with the earthquakes.

In semester one of 2012, Echo 360 personal capture was used to provide distance students with an overview of lecture content with supporting PowerPoint presentations in their Professional Inquiry course. These typically were 25-30 minutes captures of key ideas and themes of the lectures that were presented to on campus students. The on campus student lectures were 50 minutes long and feedback received from distance students was that they preferred the whole lecture captured. This is highlighted in the following comment made by a distance student:

“I am a Flo Student and feel we have been left out a lot during this course. I feel that we have been hugely disadvantaged compared to the on Campus students. Could it not be possible to record the lectures as they happen in class and put them on learn rather than a short version of an Echo.”

Another comment made by distance students was regarding the lack of on line tutorials. The lecturers had set up readings and tasks to complete at the student’s own pace; however it was apparent that students needed more interaction. This was indicated in course evaluation comments such as:

“As a FLO student we did not have an opportunity for any active involvement… Perhaps some online tutorials where FLO students can discuss points of interest should be included.”

When preparing a co-taught second semester course we had already begun the “wonderings” about how to connect with our distance students in meaningful ways. We took into consideration the feedback from semester one and decided to Echo video capture the lecture that was presented to on campus students for all students and offered on line tutorials using Adobe Connect technology for the distance students. This technology enabled us to have a “virtual space” that students would link into and participate with the week’s tutorial. In 2012 to try and involve as many distance students as possible, we negotiated the timing of the sessions that would be offered. The decision was made to offer a morning and evening session each week that would parallel the on campus workshops. However in 2013 there was less flexibility in our schedules to negotiate the timing and we decided the timing of the workshops according to our availability.

We tended to stumble along on our journey using trial and error to learn about the technology. In the first Adobe connect session we faced some issues that we had not prepared for—actually in reality we were not prepared because we did not know about these problems. The lecturer gave all students the audio rights so that everyone had an opportunity to have a voice. What happened instead was that students also typed questions and all everyone could hear was the tapping on the keys from the keyboard as well as feedback—what chaos! After that we decided that students would “chat” typing questions and we would have audio rights. Although this seemed to work alright for students at times for us there were moments of “uncomfortable silence” waiting for students to respond to our questions and that we did a lot of talking. In spite of this, these strategies appeared effective in lecturers connecting with students as evident in the following statements gathered from the course evaluation survey:

“…took on our feedback about distance learning and how it can be improved it was good being listened to.”

“Loved the adobe connect workshops provided for distance students. Helped us to feel connected to the course & more a part of it. Also helped to lessen some of the isolation distance students can feel” and

“…the interactive tutorials were fantastic!! especially being a distance student, it was really nice to have that interaction.”

Although we received positive feedback from students we still felt a level of uncertainty about how we could more effectively use technology to have reciprocity in interactions. We felt the next logical step was to gain more of a student’s voice within the Adobe Connect sessions. In the sessions the lecturer still was the main facilitator of what was happening and students had a voice through the comments and or questions they typed, however we were conscious that relationships and interaction could be more than this. In one particular 2013 session towards the end of the course students had turns with microphone and video rights. The particular topic was around a resource they had made or purchased and how they could link to bicultural aspects as discussed in the course. This was also part of
an assignment and so there was an extra incentive for students to participate. It was optional to participate but all students eagerly joined in. The lecturer stayed on the screen but did not talk at all while students were presenting, she did prompt after the presentations to enable students to elaborate further. Students were able to type questions and comments to the student presenters.

![Image](image.png)

**Figure 1:** Tina (Student) presenting via Adobe Connect to fellow students

### Key Findings

A realisation for us was that we did not have to be perfect in knowing and using the technology; rather our “give it a go” attitude enabled us to persevere with using Adobe Connect technology to enhance our relationships with students. Many times we discussed with students being risk takers and be to able learn from events that may not go the way they had planned. Although we have some moments of what we called “chaos” when things did not go according to plan not one student evaluation noted these as being problematic rather they focussed on the positive aspects of connection, learning and lecturer presence.

One of our key wonderings was in relation to “How do we model reciprocal and responsive relationships to on line students”. As previously noted it does appear evident from the feedback that students have been able to feel as if they belonged to the group and were more connected to the overall programme of study. The use of Adobe Connect enabled lecturers and students to connect in a more meaningful way than had previously been experienced by the online students. They were able to see and hear us for a more interactive session and once they had speaking and video rights were fully engaging in responsive interactions with not only their lecturers but their colleagues as well.

One aspect that we had not thought about when using Adobe Connect was the ability for us to visually show our enthusiasm and passion for the topics we were delivering via the workshops and how that inspired the students. Yet several students commented on how the video capture enabled them to see and hear the passion we both held for curriculum. One student noted that “They are passionate and explained things really well” and another commented “Passion was obvious and contagious.” If our students are passionate about what they are learning and importantly what they are experiencing, there is the hope that this is translated into their practice within early childhood centres. A lesson that really made us appreciate the importance of setting up Adobe Connect sessions with the students happened during 2013. Previously we had been able to negotiate the timing of the Adobe Connects and both of us were flexible about the timing of these. However in 2013 there were fewer options for us and therefore we set the times. One of the session times was not well attended and because of lack of attendance we cancelled that option. We learned that when thinking about flexibility it is important - to not only consider our flexibility but that of the students. The students have not commented on how often the Adobe sessions should be and we feel that a weekly session has met their needs –however we could investigate whether this is too often or not enough for them.

Our journey helped us to understand the different ways in which we were able to use Echo360 and Adobe Technology with our students. Echo captures were used to give information to students whereas Adobe Connect was used to build and maintain reciprocal relationships with students. The video and audio abilities made the Adobe Connect more interactive especially once the students had audio rights. The eagerness of students to take charge of
the microphone and be the leaders in the session surprised and delighted us. Maybe it was because the session was linked to a particular piece of assessment and therefore was more pressing for students to engage, however we did not get more attendance than other sessions.

**Future considerations**

We believe our journey with E-learning is still in its infancy. Although our online environments have been well received by students we will continue to explore ways to use the technologies available to engage and excite members of the student community. As noted earlier we tended to stumble along our journey and now we see the need for E-learning professional development as a way to move forward. We have a basic working knowledge of Adobe Connect, but we are eager to learn more about its key features and ways we can use these to enhance our online teaching environments for all participants. For example: We have only just begun to explore ways to include the student’s voice in our Adobe connect sessions. We plan to continue this practice, but are also considering ways to give students more opportunities to facilitate the sessions. Laurillard (2001) states that academic staff need to seek and be provided with appropriate support from specialist staff. The University of Canterbury has a responsibility for professional development opportunities so we will continue to seek support to prepare us to facilitate future session with our students. We hope that as we continue to seek support this will open doors for further professional development and that other lecturers will benefit from these opportunities.

We have discussed the possibility of investigating new technologies to support on-line learning. However we are reluctant to rush in and stumble our way through new E-learning software without appropriate professional development. We are aware that the introduction of new software could create unnecessary complications for the student community (and us as well) and result in students having to cope with different technologies across courses. The student feedback received through course and teaching evaluation surveys have assisted us to develop an understanding of the students experience with on-line learning. The student feedback has been a powerful learning tool, in that it has allowed us to identify and recognise ways to move forward and improve the online experience for our students. Therefore it is essential that we continue to collect student evaluations and use this feedback to redesign and shape our online programmes.

It is obvious that students enjoyed participating in our Adobe Connect sessions. We are now keen to explore how the learning gleaned from E-learning online experiences can align with students’ professional practice placements. In Mackey & Evan’s (2011) research they concluded that the redesign of online learning experiences “will need to value learning that is synchronised with, and situated in, professional practice” (p. 13). This is of particular importance in early childhood education as our students are expected to critically reflect on existing beliefs, values and theories covered in courses, in relation to their professional practice. As lecturers we need to be mindful of modelling and making explicit how to establish and maintain reciprocal and responsive relationships through our Adobe Connect sessions.

**Conclusion**

Our experiences have led us to conclude that with the development of on line learning and the use of digital technologies it is imperative that lecturers review how they are engaging with their on line students. It is evident technologies such as Adobe Connect are important in establishing and maintaining relationships within an on line learning community and should be explored further.

**References**


Acknowledgements

We would like to acknowledge the help and support of Prof. Niki Davis, A/Prof. Lindsey Conner and Lawrence Walker in the preparation of this paper. We are also grateful for the wonderful experiences that the students provided—they were patient and forgiving of our endeavours. Special thanks to Tina Shirley for the use of her photo.
Going digital in stuck places: Secondary graduate ITE students’ practicum experiences with digital technologies

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Abstract: This paper outlines some tensions that secondary graduate pre-service teachers report in relation to a requirement from their ITE (initial teacher education) programme regarding integrating digital technologies into practicum lessons. Evidence was synthesised from ITE students’ assessments regarding designing a learning purpose for, and using a digital technology in, at least one lesson during practicum, generated from Moodle and myportfolio postings over two years. It was analysed inductively (Johnson & Christensen, 2004) from two cohorts (approximately 160 students) in consecutive graduate programme years, taking place once the ITE programme had concluded. Permission to use their work for this purpose required documented individual consent in line with the ethical approval process. Tensions identified in the reports include associate teacher dispositions and familiarity with digital technologies in learning contexts, a school’s provision and policies, and the ITE programme requirements and goals for ITE students.

Introduction

This paper and associated presentation outlines some themes arising from an analysis of secondary ITE students’ reports of practice using digital technologies in lessons while on practicum. My intention is to open up debate about not only the roles of ITE educators and associate teachers in supporting pre-service teachers to experiment with digital technologies, but also some tensions inherent in this. The expectation of experimentation during practicum can bump up against associate teachers’ practices, beliefs and knowledge, and/or school policies and provisions related to digital and mobile device access. And yet associate teachers have a mentoring and support role (McDonald, 2004), that ideally is about the “student teacher and associate teacher working together in a collaborative, problem solving way with joint decision making and goal setting” (p. 85). At the same time, the ITE students’ programme providers must exhibit that same kind of can do, forward-thinking disposition, particularly in relation to using digital technologies as part of learning.

However, (borne out by anecdotal evidence from teacher education colleagues, and in feedback from student teachers) that some ITE lecturers and some associate teachers can harbour strong personal misgivings about the role of digital technologies in learning. This may reflect reluctance on their part to show any lack of digital proficiency and/or knowledge to novice teachers when they are supposed to be in the role of expert. In the case of associate teachers, an added complication is that they may teach in schools where policies actively prevent experimentation with digital technologies - particularly mobile ones. Such policies may make it too hard to fully support student teachers’ efforts to experiment with digital technologies for learning.

This short paper thus highlights some tensions inherent in initial teacher education programmes that are preparing teachers for working in increasingly ‘mobile complex’ (Pachler et al, 2010) educational environments within a digitally ‘on’ social fabric. As such, the presentation uses documented evidence from student tasks to highlight the complexity of expecting digitally integrated learning to take place.

Study Design
This article arises out of a document analysis of cohorts of ITE students' Moodle and myportfolio postings over two years. This analysis took place after students had completed the programme, so there was no possibility of any kind of interference in their study. All of the graduates were made aware of the project, and all bar one provided written consent. Over a two-year period, this amounts to over 150 sets of online documents as data, examined using an iterative analysis to identify themes and categories. A portion of this analysis informs this particular paper. These relate to:

- The influence of associates' dispositions vis a vis digital technologies on ITE students' confidence in experimenting with these technologies, and wanting to continue to do so
- The influence of a school's overall policies and practices vis a vis digital technologies
- The influence of students' responses to lessons in which they were encouraged to use digital technologies to complete specific tasks.

**Context and findings**

One of the tensions in initial teacher education (ITE) programmes is the need to be futures oriented while being pragmatic about the realities of schooling. This futures orientation links directly to the literature and discussions centred on what schools would and should be like in twenty years time. Consider, for example, Bolstad et al’s (2012) discussion of a futures-oriented education in New Zealand argues that learning has to be more personalised to better match individuals’ needs, rather than a one-size-fits-all that they contend is more prevalent at the moment. This intensification of focus on individual students requires strategic and creative uses of technologies, spaces and places. Bolstad et al also argue that diversity - inherent in a personalised approach to tailoring learning - is a potential strength. Through strategic uses of digital and mobile technologies, it is possible that more students can be supported in a just-in-time manner, whether or not they are physically on campus. This practice can support a much more diverse and individualised approach to how learning occurs. Diversity encompasses ethnicity, language, culture, ways of thinking, ways of learning, modes of learning, and flexible time, opportunities and spaces. It also reinterprets what knowledge can mean. Bolstad et al (2012) suggest that “knowledge, in the Knowledge Age, involves creating and using new knowledge to solve problems and find solutions to challenges as they arise on a ‘just-in-time’ basis” (p. 4). Assumptions such as these imply that ITE programmes have to position new teachers as nimble thinkers, adaptive help seekers (Steed & Poskitt, 2010) and able to nurture such dispositions in their students so that they too can be creative, critical thinkers and problem-solvers.

On the other hand, graduates often enter ITE with certain assumptions about the role of the teacher and the role of the ITE programme. As Hattie noted (1999), ITE students “value work experience more than learning about their experience of the work” (p. 1). Learning about the ‘experience of the work’ is an important role of ITE programmes in developing reflective practices in their students, and perhaps going some way towards reducing silos of subject knowledge Bolstad et al (2012). This view of silos suggests that curriculum delivery is content heavy, rather than focused on Key Competencies (Ministry of Education, 2007) that underpin discipline knowledge across the curriculum. Using digital technologies may help mitigate that effect, especially if they used in conjunction with tasks requiring critical thinking.

ITE programme lecturers are therefore caught between common assumptions about what teaching is about (such as delivering what the teacher knows - the teacher as expert) and what it could be in a learning landscape that is rapidly changing our access to knowledge. And while ITE providers must also prepare their learners to meet whatever the current New Zealand Graduating Teacher Standards are, ITE programmes are necessarily focused on the learner rather than the subject, along with nurturing the underlying competencies needed to develop dispositions of adaptive help seeking, creativity, critical thinking, problem-solving and comfort in dealing with diversity and uncertainty. These are important skills for ITE students, for as they gain more experience during their practicum, they become better attuned to the learning needs of those they teach (Starkey & Rawlins, 2011), and more confident in handling uncertainty.

In ITE programmes which also expect the use and modelling of mobile digital technologies as an integral part of learning, traditional assumptions about teaching (teacher as expert) and learning (learner as empty vessel) are confronted. This confrontation is related to how knowledge/information is accessed, how digital technologies are used, how ITE students respond, how teaching colleagues respond and incorporate these options, and how ITE
students are able to practise new ways of thinking about teaching and designing learning for others when they enter schools as teachers.

Many people entering ITE programmes are comfortable using digital technologies, but Crook (2012) argues that, “while there is no questioning the scale of young people’s engagement with the internet in general, evidence suggests that engagement is biased towards consumption rather than production” (p. 65). This can be true for both ITE students and school students. So awakening ITE students to opportunities that are available for embedding digital technologies and resources into learning while also developing critical thinking is a necessary ask of ITE programmes. This is especially so when ITE students report that their learners enjoy using digital technologies to help them learn and create high quality products that showcase their understanding.

One of the strongest trends in the ITE students’ reports about their efforts in using digital technologies in lessons while on practicum, is the difficulties many face. These difficulties are often centred on existing impediments within the school and the associate’s classroom. For example, many schools have poor quality technological tools available, as well as weak broadband, and restricted access because of firewalls. Another is issue is that it is not uncommon, and not always unreasonable, for associate teachers to expect pre-service teachers to emulate or replicate their teaching routines and methods. This is sometimes because the associate’s classes understand the routines of habits of their teacher, and sometimes because the associate has few variations to their practice.

Sometimes though, they are concerned that doing things differently (for example using group work instead of individual work, contributing to shared online documents or using a new digital tool) can create learning disturbance, leading to, in the associate’s eyes, lost learning time. However, an associate teacher’s role is to also support experimentation - after all, the student teacher is supposed to try things out while under the associate’s supervision. This is a very real tension that ITE students report. Associate teachers can thus help or hinder those for whom stepping into the unknown of teaching untried things is extremely difficult.

Associate teachers' mentoring is, overall, highly valued among student teachers (Starkey & Rawlins, 2011). Teaching with untried resources such as digital ones, is a scary and unsettling prospect, especially if the associate is also nervous of or inexperienced with, digital technologies. The mentoring role is hugely influential in the confidence pre-service teachers have when teaching with and through digital technologies.

Another trend in the ITE student reports on using digital technologies for learning, and possibly linked to the value they place on the associate teacher's feedback, is their positive responses when evaluating a digitally rich lesson. It is not unusual for associate teachers to be very impressed by their ITE student’s lesson and technology use, and hugely impressed with how positively learners respond. This often encourages associate teachers to ask to use the same technology and the ITE student’s lesson for themselves with other classes. There are thus opportunities for reciprocal learning that might better lead to a focus on learners’ personal learning needs, issues of diversity, better ways of integrating underlying competencies into lesson design, and tapping into the affordances that digital technologies can offer learning. In the end, we may be able to point to an education environment that purposefully creates adaptive help seekers (Steed & Poskitt, 2010), creative and critical thinkers, and nimble users of technologies that help people learn, precipitating critical thinking.

This section outlined some themes emerging from the findings. In the conclusion, these are considered in the light of what they may signify for ITE programmes' development.

**Conclusion**

One of the tensions inherent in any initial teacher education programme is to prepare pre-service teachers for what is, but also what is not yet. The digital space is especially fraught in this regard. While some schools are inching their way into digitally-rich spaces, other schools are galloping ahead. When pre-service teachers go on practicum, they may have to practise in classrooms that may be anywhere along that continuum. What appears as significant from tracking reports of practicum lessons with digital technologies over time, is that the requirement to do this is key to precipitating learning about the value of digital technologies for learning - often for both the ITE student and the associate teacher. Being required to investigate and report on using a digital technology for learning purposes forces both the student and the associate teacher to make something happen, examine its effect on learning, and examine its effect on practice. A clear trend in the report feedback from pre-service teachers is how impressed an
associate teacher often is about how positively the learners respond when they are using a digital technology to help them learn. This often results in associate teachers asking to use the resource/plan/technology themselves for future classes.

This reciprocity becomes a win-win, especially when the class, via their feedback, are positive about how the digital technology helps them concentrate on a specific aspect of learning. In continuance theory terms (Wright, in press) this positive effect is likely to encourage both associates and pre-service teachers to persist with such tools and technologies, and possibly even experiment further still, beyond the ITE programme formal assessment requirement making it happen. As Dobozy, Campbell, and Cameron (2011) argue, when “students ... (are) constructed as producers of knowledge and artefacts rather than mere consumers” (p. 12) then there is a greater likelihood of learning success. Such behaviours and practices are also necessary for new teachers and their developing teaching identity and confidence. This is more likely when there are structured opportunities and support to learn or further develop the habits of adaptive help seekers, where they can problem-solve digital issues and support others to use digital technologies to do the same. This has wider implications for the role of the associate teacher and the kinds of tasks pre-service teachers must engage in while on practicum.

References


Preservice Teachers: What do They Know about Cyberlaw?

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Abstract: This paper presents preliminary findings from an exploratory multi-method study into pre-service teachers’ perspectives regarding legal and ethical issues relevant to the use of ICT in schools. It identifies requirements for legal literacy that not only support legally compliant behaviour, but which can also support the development of active citizenship in students and highlights areas of factual legal knowledge which may require more attention in pre-service education.

Introduction

As with government policies worldwide, Australia currently puts the development of digital literacies or competencies as a key policy goal and much of the responsibility for forwarding this agenda is placed on teachers. (Ministerial Council for Education, Early Childhood Development and Youth Affairs [MCEETYA], 2008). Consequently, this brings into focus questions about the capacity of and support for teachers to deliver on this agenda.

One aspect of digital literacy for teachers that has been little-studied in the Australian context is cyberlaw literacy. Cyberlaw, in its broadest definition, encompasses not only laws specifically made to regulate the digital environment, but also general laws that are also applicable to the use of information and communication technologies (ICT) (Cyberlaw, 2005, p.177).

This paper reports some of the preliminary findings from an exploratory study into the perceptions of pre-service teachers about cyberlaw and ethical issues in the school environment. The study uses the Australian (formerly National) Teaching Standards (Standards) and Australian Curriculum (Curriculum) (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2013) as implemented in NSW as a framework for investigating the issue.

Background

Professional Requirements for Legal Literacies Within the Standards Framework

It has been noted that teachers work in a complex and highly regulated legal and policy environment with high expectations for professional expertise in a wide range of areas, including an understanding of legal issues relevant to the education system (Stewart & McCann, 1999, p.144). That this expectation extends to cyberlaw literacies is clear from examination of the Standards (New South Wales Institute of Teaching. 2012) which contain both express and implied requirements for knowledge of law applying to work in schools, including law relevant to the use of ICT (York, 2013, pp. 4-6). For example, Standard 7 contains an explicit requirement to “Comply with legislative, administrative and organisational requirements” in professional engagement (NSWIT, 2012, 19). Standard 4 deals with the creation and maintenance of “safe learning environments” and contains a similar explicit reference to “legislation” NSWIT, 2012, p.15). In addition to explicit references, Standard 4.5 at the “Graduate” (beginning teacher) level is also indicative of a need for legal knowledge. It requires “[demonstration of] an understanding of the relevant issues and the strategies … to support the safe, responsible and ethical use of ICT in learning and teaching” (NSWIT, 2012, p.15). While other issues are also relevant, it can be argued that, in the ICT environment, telecommunications, copyright, and privacy laws are certainly among those issues pertinent to the safe and
responsible use of ICT. This interpretation is supported by the related *ICT Statements for Graduate Standards* which refer to “understanding safe, legal and ethical use of digital resources and tools …” (Australian Institute for Teaching and School Leadership [AITSL] & Australian Council for Computers in Education [ACCE], 2012, p.4).

In addition to requirements relating to legal compliance, the *Standards*, read together with the *Melbourne Declaration* (MCEETYA, 2008) and the *Curriculum* also point to a need for cyberlaw literacy to support and promote active digital citizenship in students (York, 2013, p.5). Tapp & Levine (1974-1975) define “legal competence and literacy” as an individual’s capacity to resolve legal conflicts and to make rational, ethical legal judgements” (p.3) and go on to suggest that greater levels of legal literacy are required to move beyond mere compliance with, and acceptance of, law to a position of active citizenship. (pp. 7-8). A requirement for this level of literacy can also be found in descriptions of “digital competence” found in the *JRC Technical Report* (Janssen & Stoyanov, 2012, pp.18-21) and *ISTE Standards for Teachers* (International Society for Technology in Education, 2008, see especially Standard 4, p. 4).

**Prior Empirical Research**

Before turning to studies specifically directed to teachers’ cyberlaw literacies, it is informative to briefly summarise findings from studies into general school or education law literacy. School or education law here refers not only to legislative requirements specific to schools, but also to legal issues which are more general in nature which arise in a school context.

One notable feature of this research area is the similarity of conclusions which have been reached over an extended period of time, and in different jurisdictions, and at all levels of teacher experience, regarding the extent and quality of legal knowledge held by teachers. Schimmel and Militello’s extensive multistate survey of 1317 US teachers and review of 77, largely doctoral studies, typifies the recurring themes - that most teachers:

1. are uninformed or misinformed about student and teacher rights [or obligations]
2. have taken no course in school law;
3. get much of their school law information from other teachers;
4. would change their behavior if they knew more about school law; and 
5. want to learn more about these issues” (Schimmel & Militello, 2007, p.257).

That this is an international phenomenon is confirmed by a metastudy of Canadian, U.S., Australian and Botswana research (Davies, 2009). In Australia, Stewart (1996) and McCann (2006) in their studies of principals’ legal knowledge in Queensland public schools and NSW Catholic schools, respectively, identified a wide range of legal issues relevant to schools and similarly found significant gaps in participants’ knowledge. A more recent, small scale Tasmanian study by Trimble, Cranston & Allen (2013) again found low levels of legal understanding. Studies into NSW teachers’ legal knowledge and requirements for professional development were undertaken by Harapin (2003) and Newlyn (2006) and both reported significant gaps in knowledge.

U.S. and Australian studies provide evidence that in the area of cyberlaw, as with general school law, teachers and pre-service teachers may lack adequate relevant knowledge. In the U.S., the *National C3 Baseline Survey* (Pruitt-Mentle, D. & Educational Technology, Policy Research, and Outreach [ETPRO], 2008) surveyed 1,569 K-12 educators and 94 technology coordinators about C3 (Cyberethics, Cybersecurity and Cybersafety) topics, some of which were legal in nature. Additional qualitative data was collected via interviews and focus groups (pp.15-16). The study used a 5 point scale where “3” is the “threshold comfort level”(pp. 41,42, 45).

It found that teachers felt unprepared to model, instruct, or guide students on most of the topics. Only 18% of teachers felt prepared to guide students on the common practice of downloading, 31% could deal with general digital media copyright law; and 36% could deal with educational copyright issues (pp. 43-44) The highest “comfort score” in the Cyberethics area was for the topic of “Plagiarism” (3.34), but a significant minority (28%) were unprepared and only 49% were “well” or “very well” prepared (p. 46). Overall, teachers were even less prepared for issues including cyberbullying, privacy, use of social networking services (SNS), and criminal activities like stalking and harassment) (p. 46). The study notes that 75% of educators were not “comfortable” dealing with cyberbullying, a subject that had received extensive coverage in media and school settings (pp. 6, 41-43). The authors suggested that the general lack of “comfort” might be explained by the minimal amount of professional training and development received by most educators (pp. 59-61). A 2010 follow-up study found that some improvement in self-assessed preparedness to teach, but translation into classroom action was limited with 22% of
“content teachers” prepared to discuss cyberbullying with students despite extensive state and national campaigns (Pruitt-Mentle, Pusey & ETRO, 2010, p. 10).

Pusey and Sadera (2011) looked at pre-service teachers baseline understanding of C3 (p. 83) and questioned whether, so-called “digital natives” had acquired a level of understanding of C3 issues pertinent to teaching practice (pp.83,87). Their survey of 318 teaching undergraduates at a US college included tests of factual knowledge together with scale questions on “awareness” and “preparedness” to teach C3 topics. Legal issues covered included inter alia: copyright, privacy, cyberbullying, predators, hacking, defamation, acceptable use policies, end-user licence agreements, and internet –relevant legislation related to child protection, education and privacy (pp. 85-86). Overall, the study revealed low levels of preparedness. Participants reported being able to teach only 4% of the topics (mostly common uses such as email and texting) (pp. 85-87). Key pieces of legislation dealing with “student rights, school policy and data [that] teachers must protect” were among the 56% of topics that the preservice teachers had never heard of or were unsure about (pp.85-86).

Little cyberlaw-specific research has been conducted in Australia. The national IRIS Cybersafety study surveyed 2088 teachers on topics including teachers’: internet skills; cyber-safety practices; “awareness” of cyber-safety issues, response to “incidents”, type of incidents, and “awareness and [use of] … cyber-safety information” (IRIS Research Ltd and Australian Council for Educational Research, 2011, p. 9). The results indicated an overall perception that direct technical controls were “the most effective cyber-safety preventative measures in schools” (p.53), with education and information for students being seen as significantly less effective (p. 54). It is possible that, as in the C3 studies, this may reflect a lack of sufficient legal and ethical knowledge to be able to guide or model appropriate use, as noted in the above studies.

A more detailed study of Victorian middle school students,’ teachers’ and parents’ perceptions of legal risks associated with SNS found that teachers’ ideas of legal risk were vague and limited to a narrow range of issues (e.g. cyberbullying and grooming) with “little clear understanding … of the precise nature of risks that may arise from everyday SNS use” (de Zwart, M.J., Lindsay, D., Henderson, M. & Philips, M., 2011, pp.61-62)

Other Australian studies examined professional knowledge bases from a TPACK perspective, but did not investigate cyberlaw knowledge except in a very general sense. For example, the Teaching Teachers for the Future (TTF) TPACK Survey instrument measures perceptions of confidence and usefulness on a self-rated scale with items such as “How confident are you that you have the knowledge, skills and abilities to support students’ use of ICT to … demonstrate an understanding of safe, legal and ethical use of digital information and technologies” (Jamieson-Proctor, R., Albion, P., Finger, G., Cavanagh, R., Fitzgerald, R., Bond, T. & Grimbeek, P., 2013, p. 35). The survey did find, however, that pre-service teachers were “least likely to be confident that ICT would support teaching in relation to … Digital citizenship to promote student demonstration of rights & responsibilities in use of digital resources & tools (Finger, G., Jamieson-Proctor, R., Cavanagh, R., Grimbeek, P., Albion, P., Bond, T., …Lloyd, M., 2013, 16), which resonates with the findings from the other studies in this area.

The review of prior research indicates that gaps in teachers’ cyberlaw literacy have been identified internationally and that few in-depth studies have been conducted into cyberlaw literacies of Australian pre-service teachers. Because new teachers must perform at the level required by the Standards it is important to establish their level of understanding of ICT-related legal issues. The research question examined in this exploratory study is (a) What are the perceptions of preservice teachers about their professional and legal obligations regarding significant legal and ethical issues and (b) what has informed their perceptions?

Method

This study is part of an exploratory doctoral research project. A multi-method strategy was employed on the basis of its suitability for conducting an exploratory study by providing opportunities for triangulation from a variety of data sources, deeper insights into the subject area and to aid in the development of new research instruments (Denicomb 2010, p. 299). Multi-method approaches have previously been used in Australian studies into teachers’ general legal literacy (McCann 2006; Newlyn 2006; Stewart 1996) and into legal literacies related to use of social networking services (de Zwart, Lindsay, Henderson, & Philips 2011).
An earlier stage of the research identified which legal and ethical issues were significant (ie issues which might be commonly encountered in practice and/or issues which might result in serious legal or professional consequences) in the context of the current legal, regulatory and policy environment. To this end, the following categories of documents were analysed from a legal perspective: Australian and international studies into teachers’ general legal literacy and cyberlaw literacies; Australian case law and legislation; Australian Institute for Teaching and School Leadership Professional Standards and the NSW implementation of the Standards, and the National Professional Standards for Teachers - ICT Elaborations for Graduate Teachers; state syllabus and National Curriculum documents; state and national education and related policy documents; and policy documents for schools, teachers and students produced by the NSW Department of Education and Communities and major private sector employers of teachers.

Legal doctrinal analysis of available documents provides an incomplete picture of significant legal issues related to use of ICT because case law does not deal with unlitigated matters or problems or issues settled out of court. Further, teachers’ work and professional obligations can also require legal understandings that relate to aspects of pedagogy and other professional requirements (York, 2013). To gain more complete data, semi-structured interviews were conducted with informants purposively selected on the basis of their special knowledge of, and different perspectives on, legal and ethical issues affecting teachers. A total of 16 interviews were conducted with: 1 senior lawyer and 2 senior administrators from major public and private employers of teachers; 1 teachers’ union officer; 2 teacher-educators from tertiary institutions; 3 lawyers from private firms working in the education/school law area; 4 senior teachers or school managers (ie principals, deputies, subject co-ordinators, head teachers and teachers with five or more years teaching experience) and 3 early career teachers (up to two years’ experience post graduation). In an iterative process of analysis based on the model proposed by Miles and Huberman (1994) legal and ethical topical themes from the document and interview data were identified for further examination in the second stage of data collection.

In the second stage, an anonymous online questionnaire utilising Limesurvey was developed to examine pre-service and recently graduated teachers’ perceptions about the issues identified in the first stage. In developing items for the instrument, consideration was given as to the level of understanding required: by the Standards at the Graduate level, from the interviews for individual areas of legal content knowledge, and content knowledge indicated in curriculum documents.

Four students in the final year of an education degree piloted a draft instrument. Accuracy of the legal content, wording of the instrument and appropriateness of the scenarios was validated by a barrister practising and lecturing in the area of media and communications law. Further validation of the instrument and general feedback was obtained from two teacher-educators with expertise in digital literacies and one early career teacher. The final instrument included a total of 73 items and sub-items as follows: identification of educational background and prior legal training (6); sources of legal information (2); NSW and Commonwealth law factual knowledge by closed questions (24); and, current level of awareness of legal and ethical issues on 5 point self-rated scale (41). With one exception (which required participants to enter a whole number), the factual items were posed either as short scenarios or as statements about law where only one of between 3-6 alternative responses was correct. An “I don’t know” response was included to reduce guessing.

The anonymous online instrument was made available to pre-service teachers in their final semester at three NSW universities (Universities A, B and C) during October-November 2013. Data from participants who either provided no responses, or who responded only to the first two demographic questions, was not included in the analysis. The closed-item and scale responses from 235 students were analysed using descriptive statistics and this initial analysis is the subject of the following discussion.

**Results and Discussion**

This section will present summary data from the survey, before highlighting in more detail findings from the results obtained for items related to intellectual property issues. For the awareness items, overall Cronbach’s alpha was 0.973.

In terms of the second part of the research question (b) what has informed pre-service teachers perceptions [of cyberlaw issues]?, 27 (11.5% of 235 participants) had undertaken some form of legal studies prior to commencing
their current degree. Of these 14 (6% of 235) had undertaken legal studies in secondary school and 15 (6.4% of 235) had undertaken a non-law degree with legal content. In terms of their current studies, 153 (65.1%) recalled receiving some explicit instruction about legal issues relevant to schools or teaching and 41 (17.5%) were not sure if they had. Less than half the students (115 or 48.9%) recalled receiving explicit instruction on legal issues about the use of ICT in schools (e.g. use of mobile phones, internet sites, copyright, privacy etc.), and 48 (20.4%) were not sure.

While caution must be exercised in drawing conclusions from an unrepresentative sample, it should be noted that approximately 80% of the primary school teaching cohort at one University took part in the survey and returned similar figures to the aggregated percentages for the remaining two Universities. These figures reveal that the vast majority of participants received no formal legal training prior to their teaching studies. Table 1 presents responses to a closed choice question regarding significant sources of their current perceptions about ICT-related legal and ethical issues. It indicates that informal sources of information (such as friends and family and media sources) are amongst the most significant sources forming pre-service teachers’ cyberlaw and ethics perceptions outside of formal educational settings. As noted by Pusey and Sadera (2011, p. 87) relevant knowledge in this area is not “innate” and there is no guarantee younger university students have acquired this knowledge prior to commencing their teaching studies. This underlines the importance of teacher education courses in ensuring pre-service teachers’ perceptions of law align with what might be called legal actuality. As will be discussed later, in the context of individual survey items, there may be some common misconceptions about significant areas of law that should be specifically addressed during teacher preparatory courses.

<table>
<thead>
<tr>
<th>Source</th>
<th>Count</th>
<th>Percent (n=210)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friends and family</td>
<td>127</td>
<td>60.5%</td>
</tr>
<tr>
<td>Education in primary and/or secondary school</td>
<td>121</td>
<td>57.6%</td>
</tr>
<tr>
<td>Media stories</td>
<td>108</td>
<td>51.4%</td>
</tr>
<tr>
<td>Professional experience (practicum)</td>
<td>104</td>
<td>49.5%</td>
</tr>
<tr>
<td>Current teaching degree studies</td>
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<td>47.6%</td>
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<tr>
<td>Previous tertiary studies</td>
<td>40</td>
<td>19.0%</td>
</tr>
<tr>
<td>Online resources (eg Smartcopying site, Cybersmart site, online ICT forums, general searching)</td>
<td>22</td>
<td>10.5%</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
<td>2.4%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>627</td>
<td><strong>298.6%</strong></td>
</tr>
</tbody>
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Table 1: Pre-service teachers’ responses to the question: Which of the following sources have played the most significant part in your current perceptions about legal and ethical issues related to the use of ICT? (Multiple answers allowed)

The following results and discussion are relevant to the first part of the research question: What are the perceptions of pre-service teachers about their professional and legal obligations regarding significant legal and ethical issues?
Note: Participants who did not answer all questions are excluded. Data labels rounded to 1 decimal place.

**Figure 1**: Pre-service teachers’ total correct responses to 24 factual law items

For the factual knowledge items, the mean number correct was 11.96 with a standard deviation of 3.597, mode and median were both 12. The distribution of total correct answers is shown in Figure 1. Items for which pre-service teachers performed best included recognising the potential criminality of: posting threats on a website (93.4%), use of a mobile phone to video a private activity (91.2%), use of a mobile phone to send a threat (90.7%). Next came understanding the need for appropriate consent before using a student’s personal information on a public website (87.4%), and the contractual nature of terms of service or conditions (79.6%). The lowest percentage of correct responses were for items which dealt with: typical terms and conditions for social media websites (6.8%); the age of criminal responsibility (13.2%); students recording, disseminating, or downloading a video of a schoolyard fight (20.2%); fair dealing with online materials and other copyright facts about copying of online materials (21.2%); defamation (24.3%). The percentage correct for 15 of the items was less than 60%. These figures point to a number of areas of law which may require more attention either during university studies, or in the course of employment.

In terms of awareness, the items where pre-service teachers reported the highest mean level of awareness (based on a 5 point scale where 1 is no awareness, 3 is neutral, and 5 is very good) were: how to use and acknowledge material to avoid plagiarism (3.97), need to maintain appropriate professional profile online (3.55), duty of care to students regarding the use of ICT (3.50), need for an appropriate professional context for all communications with students (3.45). The lowest levels of awareness were reported for: appropriate use of NEALS (National Education Access Licence for Schools) materials (2.15), voyeurism laws, appropriate use of Creative Commons materials (2.53), and categories of materials protected by copyright (2.56).

It is not possible to categorically state that giving the correct answers reflects actual knowledge of law on the part of a participant. Apart from guessing, common sense perceptions of law may result in a correct answer, but the reasoning of participants may be related to feelings on that the activities were right or wrong from a moral or ethical perspective and this is an area of inquiry worthy of further study. Interestingly, a small number of participants mentioned “common sense” in open items as a source of information about legal and ethical issues in the school environment. However, it is informative to look at responses to factual questions where the moral or ethical aspects or beliefs may not be so closely allied with legal actuality, as well as related items from the awareness section of the survey. For this reason, the intellectual property items will now be discussed in more detail.

There are some interesting features about the items related to intellectual property in the awareness items and factual items. Figure 2 illustrates the spread of responses regarding intellectual property legal and ethical issues (Cronbach’s alpha for these items was 0.905). Participants recorded relatively high levels of awareness of plagiarism, but for
fundamental copyright knowledge such as the general principles of authorship and ownership, categories of materials protected by copyright, moral rights and fair dealing exceptions, between 35% to 46% percent reported no or poor awareness, and only 12% to 25% reported good or very good awareness. In the factual items: 42.7% of participants were able to correctly identify in a scenario question that a school student would own copyright in their homework, 25% did not know, and the remainder chose incorrect options; in another scenario item, 28.2% of participants correctly identified that an idea was not protected by copyright, but failure to acknowledge the source of an idea would be plagiarism; and when presented with 3 popular “myths” about copying from online materials, only 21.2% correctly chose the “None of the above” option. From this it appears that there are significant gaps in the participants’ knowledge of copyright law.

Copyright law is one area where teachers require more than vague factual knowledge for at least two reasons. First of all, in terms of the Standards discussed earlier, to assess whether a use of a technology to copy something is “safe” or “responsible” requires an understanding of the risks of criminal or civil law sanctions for illegal use of copyright material and understandings of some fundamental copyright principles such as understanding what material is protected by copyright, what amounts to a breach of copyright law and what might be a legitimate use of copyright material. Copyright infringement was also identified as one of the most significant legal risks that teachers should be aware of by de Zwart et al (2011, p. 1). Second, the Curriculum places ICT as a General Capability to be included as content in all Curriculum subject areas from F-10 (ACARA, 2013, p.50). One of the elements of the Capability is “Applying social and ethical protocols and practices when using ICT” (ACARA, 2013, p.50). Students are expected to be able to develop legal and ethical literacies about ICT, in both the compliance sense (e.g. “identify the legal ownership and use of digital products” by the end of year 6) and in the active citizenship sense (e.g. “identify and describe ethical dilemmas and consciously apply practices that protect intellectual property” by the end of Year 10) (ACARA, 2010, summary table, p. 53). As a consequence, this becomes required content knowledge for all Australian teachers.

One limitation of this study, apart from being based on a non-representative sample, is that it does not examine cyberlaw perceptions in practice. For example, while teachers must sometimes act almost instantaneously to a

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Note: Percentage for each survey item is based on the total number of participants that answered that item (n per item range is 209-212). Data labels representing percentages are rounded to zero decimal places.

**Figure 2:** Pre-service teachers self-rated awareness of intellectual property issues
classroom situation, in other cases, there is time for a teacher to research or seek advice about a particular issue before acting. It does not assess the ability to find and interpret relevant information, which is an important skill in developing and maintaining appropriate levels of cyberlaw literacy. Another limitation is that it isolates the investigation of participants’ perceptions to a particular point in time, and does not investigate the transition between graduation and the induction period and initial years of teaching.

**Conclusion**

With continuing rapid changes in technology, adoption of technologies and the associated legal and ethical challenges, it is particularly important to interrogate whether teachers’ legal literacy is of a type that allows them to adapt practices to this dynamic environment. This is particularly significant for the increasing proportion of new teachers employed on a casual and temporary basis (Stevenson, 2012), who may not have access to the same support as permanently employed colleagues. This study has provided information about the status of pre-service teachers’ cyberlaw literacies relevant to the current Australian teaching regulatory framework and *National Curriculum*. It has highlighted some areas which might be investigated in more detail such as the misconceptions about legal issues held by pre-service teachers which may persist if not addressed during their time at university.

In terms of the first part of the research question, the survey responses indicated that while there are a number of areas of law where pre-service teachers appear to have relatively accurate perceptions, there are some gaps in their knowledge, including a significant gap in their understanding of fundamental copyright law relevant to teaching. In terms of the second part of the research question, informal sources were amongst the most significant influences on pre-service teachers legal perceptions about ICT. From these findings the importance formal of teacher education, including experiences on practicum, in addressing pre-existing misconceptions was highlighted. While this paper raises the possibility that more extensive training in legal issues might need to be provided before graduation, the difficulty of adding to an already crowded curriculum for pre-service teachers must not be underestimated.

**References**


Acknowledgements

Lucy York is a Quentin Bryce Doctoral Scholar and Teaching Fellow in the Faculty of Law, University of Technology, Sydney, Australia. Funding for attendance was provided by the UTS doctoral program. The author thanks her joint thesis supervisors Professor Sally Varnham (Faculty of Law) and Associate Professor Matthew Kearney (Faculty of Arts and Social Sciences) for their feedback and encouragement at all stages of the research.
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