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Partnerships in ICT Learning Study

Case studies

OCTOBER 2007

Edited by
Chris Reading

AUSTRALIAN COUNCIL FOR COMPUTERS IN EDUCATION

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Foreword

The formation of state and territory-based projects was a core design feature for the *Partnerships in ICT Learning* (PICTL) study, stemming from a recommendation in the *Making better connections* report (DEST, 2001). From the outset of the PICTL study, the design, management and implementation of these projects was seen to be a critical aspect of the entire study.

Two important principles governed the implementation of this work. Firstly, considerable evidence suggests that effective professional development is managed locally and is situated within the daily lives of the participants. Therefore the design of the projects needed to be influenced by local factors and the practicalities of the relationships within the projects.

Secondly, the duration of the projects implied that each one should not attempt to be all encompassing in its research scope but should focus on the questions that could be best addressed within the local context. The management team for the national study believed that although the state and territory projects might address different issues, the collective experiences and pooled knowledge would enable the research questions of the national study to be addressed.

Hence the partnerships in each state and territory were invited to design the structure, scope and research focus for its project. The success of the PICTL study relied heavily on the ability of these partners to identify relevant issues within their local contexts and devise their unique project and associated management. That was achieved and each of the projects contributed important knowledge for the national study.

In several cases, the state and territory projects demonstrated the importance of building on long-term relationships or the need to consider new ways of using ICT in classrooms. Implications of the work beyond the immediate project was evident in the ability of projects to influence the future design of undergraduate programs or to influence the policy of school authorities with respect to pre-service teachers' contribution to the use of online environments for schools.

The project reports detailed in the following chapters provide an insight into the originality and perception displayed by the partnerships in each state and territory project. The PICTL study was dependent on each state and territory project team's ability to skilfully address the challenges of each project and generate the experiences from which others can learn.

On behalf of the Steering Committee, I wish to express our thanks for their important and successful contribution to the PICTL project.

Ralph Leonard (PICTL Steering Committee Chair)

Acknowledgements

The PICTL study was a large research enterprise involving groups of pre-service teachers, teachers and teacher educators in each state and territory. Its success has depended upon the efforts, support and goodwill of many people and education groups throughout Australia. We acknowledge with appreciation this support and the enthusiastic way different partners have made special contributions often beyond what might normally be expected. Part of the reason for this support lies in the importance for Australia of having ICT-mediated learning embedded with the ongoing teaching and learning processes in our schools. We hope that the findings and the recommendations within this report justify the trust and support of those people who have made contributions. The PICTL Management Committee acknowledges the contributions of the following individuals and organisations.

The Department of Education, Science and Training, for funding the project through the Australian Government Quality Teacher Programme. In particular, we are indebted to Ms Louise Hanlon, Ms Louise Wells, Ms Sue Hollands, Ms Mary Gorman and Ms Elise Rogers.

The National PICTL Study Evaluator Professor Toni Downs (Charles Sturt University).

A National Steering Committee was selected to place the PICTL study within localities, provide advice to the consortium partners managing this project, and promote debate and discussion leading to recommendations.

The Steering Committee included Ms Jillian Dellit (The Le@rning Federation), Professor Denis Goodrum (Australian Council of Deans of Education), Associate Professor Kathryn Moyle (National Institute for Quality Teaching and School Leadership), Ms Heather Woods (ICT in Schools Taskforce Secretariat).

The Recommendations Committee also included Mr Will Morony (Australian Association of Mathematics Teachers), Associate Professor Lyn Schaverien (University of Technology Sydney).

Assisting the Report Writing group were Associate Professor Lyn Schaverien and members of the National SiMERR Centre: Dr Terry Lyons (Post Doctoral Research Fellow) and Dr Greg McPhan (Research Fellow) who provided advice on the findings and recommendations; and Professor Ross Thomas (Honorary Professorial Fellow) and Ms Terry Wright (Project Officer) who took on editing roles.

We appreciate greatly these efforts and will do our utmost to ensure that this report leads to significant and effective action.

Ralph Leonard (PICTL Study Chair)

John Pegg

Chris Reading

Katherine Schoo

Michelle Williams

October, 2007

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Introduction

This report is a companion to *Partnerships in ICT Learning: Full report*. It provides the detailed reports from the eight state and territory projects that were a fundamental component of the *Partnerships in ICT Learning* (PICTL) study and the report from the National PICTL Forum.

The PICTL study was designed to determine how classroom-based professional learning projects can be collaboratively designed to incorporate pre-service teachers, teachers and university staff. The eight state and territory projects focused on quality uses of ICT, within new curriculum reforms and pedagogical agendas, which influence designs for professional learning for all stakeholders. The projects were conducted within each of the states and territories by separate research teams.

The state and territory projects were not expected to function in isolation. A PICTL Professional Community was developed to host professional conversations about the study. The final report from the PICTL study is a synthesis of the experiences and knowledge gained from the state and territory projects and from the broader professional knowledge of the stakeholders in these projects. In particular, the PICTL study management team facilitated conversations with and between state and territory project teams, to encourage responses to research questions from a broader perspective than the particular state or territory project.

The PICTL study culminated in the National PICTL Forum, where presentations from the eight state and territory projects provided a significant contribution towards stimulating discussions to frame final recommendations. The report prepared at the conclusion of the forum follows the eight state and territory reports.

State/territory project report structure

Each state and territory project was designed to address local research questions and to contribute towards addressing the PICTL research questions. The reports were analysed to provide data for the *Partnerships in ICT Learning: Full report*. A proforma was provided for the states and territories to structure their project reports. This assisted the study management team to condense the state and territory reports into a comprehensive report of the national study. The elements of the proforma are:

- Executive summary
- Purpose of the project
- Context
- Partnership
- Project design
- Data collection and analysis
- Results
- Discussion and implications
- Conclusion and recommendations
- References
- Appendices.

The reports varied considerably in length and some have been modified to suit the specifications of the compilation of reports in this volume. Each report represents the distinctive nature of the particular state or territory project within the scope of the PICTL study.

Overview of state and territory projects

The following chapters contain the eight reports from each of the state and territory projects. Each report provides responses to the unique research questions for the particular state or territory as well as addressing a subset of the PICTL study research questions. Overviews of each project are provided as an introduction.

The **Australian Capital Territory** (ACT) project brought together the University of Canberra, the Department of Education and Training and two secondary schools. A group of 12 pre-service teachers undertook a series of secondary teaching studies experiences where they learnt to consider ICT and facilitation models that promote collaboration. The project made use of a number of different technologies, including a team-learning system used to scaffold complex thinking (Zing), a collaborative knowledge creation application (Wiki) and a tool (Elgg) to help students to use blogs, electronic portfolios and social networking. This proved to be an exciting and timely project, with strong support for the use of collaborative systems in teaching and learning. Schools found taking on pre-service teachers and new ICT simultaneously, very challenging. However, pre-service teachers need the support of school environments to implement new uses of ICT or the intensive model of professional learning will not be sustainable.

The **Tasmania** (TAS) project brought together the University of Hobart, the State Government, the Australian Education Union and schools. This project was designed to provide opportunities for pre-service teachers to collaborate on innovative ICT-based teaching designs with practising teachers. The focus for university staff was to synthesise the generic attribute of information literacy in problem-solving with the Information Literacy in the Essential Learnings Framework. Pre-service teachers were involved in an action research project with university staff and teachers (critical friends and co-developers) to use this framework to construct lessons and projects, which they implemented while on teaching practicum. Despite initial difficulties in recruiting pre-service teachers, this project was well received by in-service teachers. Overall, the gains experienced as a result of this project were beyond expectations, and the potential for cultural change was indicated by the sharing of planning and implementation outside the project-targeted classrooms.

The **New South Wales** (NSW) project brought together the University of New England, the Country Area Program Northern Network and eight primary schools in the north of the state. This project was designed to support teachers and pre-service teachers in their professional learning as they embedded ICT and Learning to Learn (L2L) strategies in learning. Each pre-service teacher was linked with a teacher and a lecturer to form a learning team, based at a particular school to implement a short-term, teaching-based project. Together these learning teams were formed into a learning community that investigated how to measure the value added from using ICT in learning. Part of the success of this project was attributed to pre-existing ICT use in schools and a strong network of teachers. Participants embraced the learning team approach, but at the same time, found it challenging. The project reported that sustainability of similar partnerships would require a school-level rather than teacher-level focus, and better integration into the pre-service teacher education program.

The **Western Australia** (WA) project brought together Edith Cowan University and two schools, one primary and one secondary. This project built on a long-term partnership and sought to reform the integration of ICTs within a whole-of-school philosophy. The overall aim was to promote the development of powerful computer-supported learning environments for students in schools by providing a model of professional learning for teachers, pre-service teachers and academics, designed to increase their professional ICT capability. Pre-service teachers worked collaboratively with teachers and academics in a mentored action-learning situation to implement new applications of ICT support for learning in a relevant component of the curriculum. Providing a substantial number of teachers from one school with away-from-school time was beneficial in developing understandings and collegiality, as the teachers explored a variety of ICT applications. The inclusion of pre-service teachers in the project was challenging and their preference is for activities and work in schools that are a compulsory part of certification.

The **South Australia** (SA) project brought together the University of South Australia, the Technology School of the Future and various schools, both primary and secondary. This project was seen as an innovative strategy for providing school-level training resources for the EdSuite tools, by focusing on the educational potential of the portal and within a local context. A collaborative learning space was created for use within the eduCONNECT online environment, allowing pre-service teachers to move between the university and school settings and work with both teachers and university staff. Activities were delivered during practicum by the pre-service teachers and an action learning model was used to reflect on the capacity of online environments to support higher-order thinking and substantive communication in curriculum contexts. Despite practical limitations with the online environment, the pre-service teachers viewed the project as a productive learning experience and teachers had a high level of engagement with the materials. Indications are that for success, projects need to be school-based and where possible, school-initiated, and that pre-service teachers need school-based projects to be part of their accredited study program.

The **Northern Territory** (NT) project brought together Charles Darwin University (CDU), the Northern Territory Department of Employment, Education and Training (NTDEET) and a range of schools (although findings were only provided for two). It was designed to enhance the integration of ICT in learning through the development of e-portfolios compiled by pre-service teachers (with a diversity of ICT experiences), mentor teachers, and staff from CDU and NTDEET working collaboratively as a community of learners. The participants investigated, as co-learners, the potential of online environments (in particular Elgg) to meet new curriculum and pedagogical demands by designing online curriculum experiences for school students. Although some implementation issues arose during the project, including the late start and unexpected complications with the online environment, the importance of site visits to recognise potential threats to the project and the potential of developing synergies to support professional learning was recognised.

The **Queensland** (QLD) project brought together James Cook University and two clusters of schools (including primary and secondary schools) in the far north of Queensland. The project goal was to construct a Virtual Professional Development College in the form of an electronic action learning data base and repository (online portal). This college could be used by pre-service teachers, teachers, university academics and teacher professional development providers to tie local ICT innovations and New Basics initiatives in schools more closely with learning, teaching and research programs within the university. Collaborations between pre-service teachers and university staff were designed to enable the pre-service teachers to be mentored through initiating innovation in ICT while drawing on the expertise of school-based ICT champions. Collaborative knowledge constructed during this project was planned to effect the shaping of the design of undergraduate programs. In this project pre-service teachers were found to be a catalyst for change, although the schools did not become "hotbeds of innovation" as there was a plateau effect after the initial period of rapid recruitment to new innovations. The development of the portal contributes to the sustainability of the project by giving the created networked community their own localism.

The **Victoria** (VIC) project brought together the Australian Catholic University National, Ballarat Catholic Education Office, the Victorian Department of Education and Training and catholic and state primary schools. This project was a journey expanding participants' knowledge, understanding and skills with a view to changing thinking and mindset. Two dimensions of transformation were considered: the nature of collaboration and partnership, and a pedagogical focus on how technology might be embraced in a teacher's thinking. The project explored an adaptation of an holistic model which emphasised the human aspects of working together, and empowerment of the participants as individuals and as members of a partnership. Five different styles of partnership were formed from one teacher with one pre-service teacher, to teams of five with both teachers and pre-service teachers. The stories of these partnerships provide a rich description of this project with motivation being a key success factor. Participants particularly appreciated the time allocated for reflection on the project activities. The transformational model was used to encourage participants to become change agents, thus fostering sustainability.

Overview of National PICTL Forum

The **Forum** was designed as a two-day program to share early results of state/territory projects, investigate emerging issues and consider national implications for changing pre-service teacher education and in-service education professional learning models. A variety of presentations from keynotes, projects, and individual participants stimulated workshop and panel style discussions. Roundtable discussion was supported by the use of the Zing Conference system. The report provides a synthesis of the outcomes of the forum that were drawn from the keynote addresses and discussion sessions. The forum highlighted the advantages of site-based real-time learning and the need for universities and schools to act as agents to shape the change that ICT is bringing to learning.

Advancing professional learning pedagogies with collaborative knowledge creation technologies

REPORT FROM THE AUSTRALIAN CAPITAL TERRITORY PROJECT

Robert Fitzgerald, University of Canberra

Executive summary

Internet-based technologies such as electronic mail, online games and instant messaging systems are playing an increasingly significant part in our children's daily lives. At the same time this is occurring there are a multitude of emerging applications that are being developed in the Web 2.0 tradition (Alexander, 2006). Web 2.0 refers to social technologies that enable users to publish, communicate, and engage in social networking anywhere, anytime and on any device. These are collaborative systems that allow users to create content and aggregate their knowledge in ways that help them make sense of their technological worlds and relationships. These are also social systems that are fundamentally "open" with no one leader or director, but are maintained by communities of peers. While it is difficult to predict what these nascent technologies will look like in the future, their impulse is directed towards helping groups of like-minded people interact, exchange and share ideas — what Etienne Wegner refers to as Communities of Practice (Wenger, 1999). The way that education systems, teachers, universities and parents choose to engage with this emerging reality will determine the future of ICT in education and how successfully we address what Chris Dede (2005) identifies as the learning needs of the neomillenial learner.

This final report details the ACT component of the Partnerships in ICT Learning (PICTL) study — Advancing professional learning pedagogies with collaborative knowledge creation technologies. The project resulted in a redevelopment of a Secondary Teaching Studies unit to support pre-service teachers' use of collaborative technologies such as wikis, blogs and team-learning systems. Even though these teachers were limited in the time they could spend with these technologies they appeared to be able recognise their pedagogical potential.

Three classroom projects were planned, and to date only the Year 7 SOSE project is currently underway. In less than a week these school students have been able to harness the power of a wiki for their classroom work. The class teacher and project leader both believe the students' accomplishments are a testament to the power of putting technology "in the hands" of learners.

Universities and schools need flexible and responsive ICT infrastructure that can respond to the rapidly changing internet landscape (i.e., Web 2.0). In particular educators require computer resources that can provide spaces for experimentation and innovation with their students.

Our project was not able to thoroughly test the proposition that the practicum was the best place for addressing the challenges of ICT integration. Informal discussions with our students suggested that in view of the assessment issue, the practicum may not be the best place for pre-service teachers to undertake experimentation and innovation with ICT.

Questions of sustainability were not able to be adequately answered in the short time frame of this project. It is our belief that there is "no going back" once the pedagogical conversation has been started around collaborative technologies. Schools are facing the reality of a growing band of IT-savvy students

and an ever-widening gap between home and school use of technology. The technological systems and models of pedagogy that school systems choose to promote will ultimately determine the future of ICT in education. The future is here. How we choose to distribute this future will be telling.

Purpose of the project

The key aims of this project were to:

- investigate how various technologies such as wikis, blogs and team-learning systems can be used to foster collaboration; and
- assist teachers (pre-service and in-service) to reflect upon their understanding of the conditions that motivate teachers to expand their use of ICT.

The key research questions were:

- What are the pedagogical benefits, barriers and challenges to implementing collaborative ICT-based knowledge creation pedagogies in selected ACT secondary classrooms?
- What are the implications for practice around promoting continuing and deep professional conversations between teacher educators, teachers, pre-service teachers and students on innovative uses of ICT to support curriculum reform?

Context

There is wide-spread recognition that learning in the future will depend increasingly on the innovative integration of information and communications technologies (ICT) into teaching and learning. The recently-released statement Pedagogy Strategy: Learning in an Online World (2005) promotes the view that ICT can enhance student learning by creating new opportunities for learning. It is also understood that innovative applications of ICT offer educators unique opportunities to work together to develop new pedagogies (Research strategy: Learning in an Online World (2003)). At the local level the ACT Government has made a firm commitment to enhancing ICT in schools to promote a community of learning and innovation (Minister for Education, Youth and Family Services, Ms Katy Gallagher MLA, ACT Government Media Release, 4 May, 2004).

This final report details the ACT component of the PICTL study — Advancing professional learning pedagogies with collaborative knowledge creation technologies. The ACT project, described later in this report, was founded on the assumption that any teacher who attempts to integrate ICT into his or her teaching and learning becomes both an educational innovator and reformer, at least in terms of his/her own school-based specific curriculum context. In this process teachers engage in both a pedagogical and technological dialogue around ICT integration issues. The ACT project was a pilot research project designed to build stronger links between the University of Canberra's pre-service teacher education program and the continuing professional development of teachers in the use of information and communication technologies (ICT).

Partnership

From the beginning we decided that as we would be working with technologies that were not present in our target schools, it would be crucial to build a relationship with each school prior to placing pre-service teachers or working in these classrooms. Therefore, in late 2005 the project leader initiated a series of meetings and conversations with key school personnel. While this approach proved valuable it also restricted the number of schools we could work with. In the original project description we proposed the formation of a steering committee comprised of representatives from schools, field experience, university staff and the Department. The compressed timeframe of the project meant that this steering committee did not meet due to significant staffing changes — in the Department, our

field experience unit and one of the schools. We opted for a more organic management structure involving mainly the Project Leader and the Unit lecturer/evaluator. To ensure some degree of transparency we provided regular presentations and information session to various groups. These included the schools, the National PICTL Reference Committee, the DEST Management Committee and the ACCE Management Committee.

Project design

In this project a final group of 12 pre-service teachers, enrolled in their Secondary Teaching Studies (Technology) unit at the University of Canberra, undertook a series of university experiences where they learnt to consider technologies and facilitation models that promote collaboration. This work was integrated with the secondary teaching studies requirement of their teacher education course.

The ACT project made use of a number of different technologies. The first was the Zing team learning system (http://www.anyzing.com.au). Zing has the capacity to scaffold complex thinking, support sense-making and foster decision-making processes (Fitzgerald & Findlay, 2004). It uses a graphical user interface to encourage active participation while also supporting "double loop" learning (i.e., action-learning). We used Zing to encourage pre-service teachers and teachers to discuss the possible applications of collaborative technologies in the classroom.

Our work was also supported by the use of a collaborative knowledge creation application called a Wiki (http://www.wiki.org/). Wiki applications are open source software (OSS) tools designed to allow many users to work together on the same document. A good example of the potential of this approach can be seen in the Wikipedia project (http://en.wikipedia.org/wiki/). In our project we saw Wikis as much more than just a free piece of software for classrooms. It offered an exemplary model of learning that supports both individual and community knowledge creation.

As a part of this project we also trialled Elgg (http://elgg.net/) as a tool to help our students to use blogs, electronic portfolios and social networking. Elgg is a robust and flexible tool that is being used by a variety of educational groups. The developers, Ben Werdmuller and David Tosh, have tried to develop what they refer to as a customisable learning landscape that combines blogs, e-portfolios and social networking. Their goal is to create an engaging environment for learners to create their own learning space and then connect to others, forming online communities of learning. We negotiated with the developers to set up our own Elgg site at http://learn.elgg.org.

Our schools

In this project we identified two secondary schools to work with following a presentation to the ACT Principal's Association in 2005. Two schools expressed interest — one government and one non-government secondary school from the ACT. Both schools were considered to be well-advanced with their ICT work and recognised the importance of driving the ICT integration agenda forward. One school operates its own intranet and has recently been using an open source system (i.e., Moodle — http://www.moodle.org) as its learning management system (LMS). The other school uses the ACT Department of Education's supported MyInternet system (http://www.myinternet.com.au/). Neither school system currently offers blog, wiki or structured electronic portfolio functionality to their students, though both schools acknowledge that staff have shown interest. The school running Moodle has been able to download a wide range of plugins, including a simple wiki based on the ErfurtWiki module. (http://erfurtwiki.sourceforge.net/) These plugins, and Moodle's more student-centred design, have given them a considerable advantage and flexibility in the way they might advance their collaborative technology agenda. MyInternet is a more structured approach to elearning and while technically robust and strongly administered, it does not appear as customisable as Moodle at the school level. Discussions with Daniel Ingvarson from MyInternet have presaged significant future

developments in this product, though it appears the top-down administration model will continue. Neither school currently uses the Zing technology, though a teacher from one of the schools was involved with an early version of Zing a few years ago.

Promoting professional learning

To achieve quality in teaching and learning we know that teachers must be given time to trial and plan their approaches, implement the changes and then reflect upon their achievements. The action-reflection cycle allows teachers to generate ways to improve and sustain their work. This project was designed to engage stakeholders in a professional learning conversation around the pedagogical impact of ICT. In a short period this project has begun this process through regular exchanges with key school contacts, school-based meetings and seminars and most recently, with the co-design of three small classroom projects. What is clear is that a partnership is being formed between the university and schools, primarily by establishing a "working" relationship. The PICTL study has provided significant momentum for these conversations but it is too early to evaluate the extent to which these conversations will be sustained. One factor working in favour of this dialogue continuing is the increasing pressure that schools face from their IT-savvy students to take-up these technologies. As an example, the experience of working with Year 7 students has shown us the high level of enthusiasm and capacity of these students to apply wiki technology to their work.

Timeline

The final implementation timeline was different from the one we proposed. We needed to modify this primarily due to the interaction of university processes such as contract negotiation and ethics approval timeframes. It also became clear that it would not be possible to select a pre-service teacher cohort in 2005. The best we could achieve was to identify the teacher education module that we would work within and begin the planning and re-rewriting process.

From September to December 2005 we undertook the following:

- held initial meetings with schools to develop relationships;
- initiated professional conversations with schools through regular visits;
- identified a suitable teacher education module as a vehicle for the project and began re-writing this module (i.e., Secondary Teaching Studies-Technology);
- began the process of testing and trialling the various collaborative systems we would be using (i.e., Elgg, Zing and Wiki systems); and
- established a relationship with the developers of the Elgg system.

From February to March 2006 we undertook the following:

- began teaching the STS unit in late February 2006;
- implemented the professional learning component of the project, conducting a number of professional seminars with a school in Term 1, 2006;
- attempted to place our pre-service teachers with our preferred schools; and
- initiated a series of classroom projects using the collaborative technologies.

Secondary Teaching Studies (Technology)

We selected a specific cohort of Secondary Teaching Studies (Technology strand) pre-service teachers based on the high level of interest expressed by their lecturer, Lynn Sheridan. While this had significant positive effects it also restricted the range of teaching placements our schools were able to accommodate when the reality of getting teachers to take pre-service teachers was confronted. One of the schools had a very large turnover in staff from 2005 to 2006 (30%) and our key school contact was required to continue acting in the position of principal. The end result was that neither of our

two schools was able to place any of the STS pre-service teachers during Term 1, 2006. For professional reasons we did query the reasons that teachers were not able to take pre-service teachers. While speculative, it is quite possible that the combination of taking a pre-service teacher and working with these new technologies may have been too onerous.

Classroom projects

Partially in response to the practicum placement challenges, we decided to explore the possibility of working directly with keen classroom teachers, even though they would not be taking pre-service teachers. Following a series of meetings and professional learning sessions with our partner schools, we identified three classroom projects that began in Term 2.

The Year 7 project is using wikis in the Studies of Society and The Environment (SOSE) area and was designed to help students work in teams to both document, and create knowledge. The main focus is on building a community-of-practice in which students share and critique their peers' work with the aim of building high-quality resources that can be used by other SOSE classes. The school students have expressed a desire to eventually contribute their knowledge to Wikipedia. While this class project has only been running since late April 2006, the enthusiasm of the pre-service teachers has been impressive and in the space of a week they have been able to engage with the technology so effectively that they have co-created the foundation of a significant school resource. We have logs that document the complete history of their interactions and knowledge creation activities in a way that "reveals" their collaboration. The class teacher and project leader both believe the students' accomplishments are a testament to the power of putting technology "in the hands" of learners.

The Year 12 project in Chemistry is using the Elgg system to build Chemistry knowledge about Spectroscopy, using collaborative technologies. This project will utilise internet-based resources such as selected RSS (Really Simple Syndication or Rich Site Summary) feeds from high-quality scientific publications to enrich students' understanding of Board of Studies (BOS) chemistry concepts. In teams they will use wiki technology to work together to develop small projects around selected topics. It is hoped that the projects will also help develop students' understanding of the role of the peer review process in Science.

The final project is a Year 10 History project on "World Wars". This project will provide the class with a private wiki space (http://wikispaces.com) and blog functionality from Elgg to enable them to undertake project work and reflections around the topic. Again, the focus will be on building a community of practice in which students can share and critique their peers' work, with the aim of building high-quality resources and at the same time exploring the potential of this collaborative technology.

Data collection and analysis

The project generated data using a variety of processes. The electronic portfolio system, with its blog functionality in combination with a reflection process, allowed the pre-service teachers to document their experience in this project. The Zing team-learning system allowed us to conduct a series of focus group meetings with teachers and pre-service teachers. We also conducted a short PMI (Plus-Minus-Interesting) survey on collaborative technologies about mid-way through the unit.

Our analytic methods drew primarily on more thematic and qualitative approaches as we engaged with the evolving nature of the project. With some of the data we were able to explore some techniques that allowed us to visualise the data with tagging and keyword analysis (i.e., Cloud Tags — a visual frequency map). The combination of the data, in concert with our experience in teaching and working within this project, meant that our conclusions are necessarily situated and tentative. Nonetheless, the data do raise important issues that need to be considered by schools, systems and universities.

Results

Focus groups: Talking to pre-service teachers about ICT

We asked the pre-service teachers what skills, capabilities and knowledge they thought current school students would need to be successful in the future? In their focus group discussions they identified a number of key themes including: competence with ICT, the importance of life-long learning skills, an understanding of ethical issues such as values/morals and confidence/self belief. Taking the text generated by this discussion we created a Cloud Tag (Figure 1). This cloud appears to resonate with the key themes that the group identified.

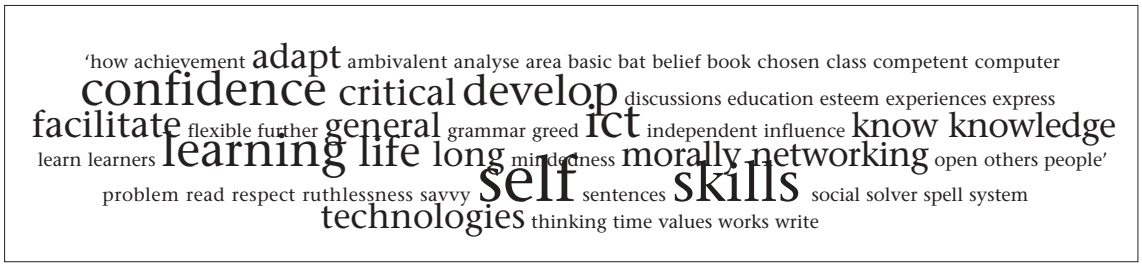


Figure 1. Cloud Tag — What skills, capabilities and knowledge do school students need?

When asked "What does ICT in learning mean to you?" pre-service teachers identified themes in the data that recognised ICT was strongly implicated in future learning, particularly in enhancing knowledge and communication. The "problems" of ICT with respect to access and equity were also evident. Again the Cloud Tag (Figure 2) seemed to support the Focus group themes.

Figure 2. Cloud Tag — What does ICT in learning mean to you?

Reflections on using the Personal Learning Landscape (Elgg)

With our pre-service teachers we attempted to create a virtual space for them to engage in a community of practice. The Elgg system offered features of Web 2.0 technology that emphasised the importance of connectivity and engagement. The developers of Elgg often refer to their system as a Personal Learning Landscape (see Appendix 3) and this was entirely congruent with our learner-centred approach to the use of technology. While we encouraged the pre-service teachers to use Elgg, we provided them a virtual space that they controlled. This stands in contrast to many elearning applications that are controlled by a lecturer/teacher and focused predominantly on the delivery of content.

Usage statistics from our Elgg site showed that it was a space used by the pre-service teachers for communication and exchange. Throughout the course of the PICTL project six accounts of type "community" were created. As at 8 May 2006 there had been 138 blog posts with 71 comments (made by peers on those posts) with 152 files uploaded to the site. As the use of Elgg developed throughout the project we observed an increasing number of comments being made on blog posts suggesting that a dialogue was developing.

The pre-service teachers commented:

> I can however see a place for blogs in schools. Especially as tool for pre-service teacher's to reflect… I will look at them for lodging ideas for discussions, and this exchange of various ideas will come in handy for them in future projects.
>
> I have some thoughts on using them in my teaching of Ag — ideas such as setting up a trading site where we could use e-markets to model real market imperatives for producers — using an Elgg site to facilitate self evaluation and reflective learning and sharing of ideas between students and using ICT to access models of agricultural functions…
>
> Elgg would offer a tremendous opportunity to establish communities of DE students where they could interact with each other, share experiences and supplement the contact they have on the very few occasions they come to the DE face-to-face school — it would be particularly brilliant for those students who are overseas.
>
> Blogs are a new opportunity for educators; they offer educators a tool for students that is interactive and provides an immediate publishing tool… The concern is that the greater the interaction with students, the more expectation is placed on the educators.

Collaborative technologies survey — PMI

About mid-way through the project we conducted a short PMI (Plus-Minus-Interesting) survey with our pre-service teachers. The return rate was nearly 60% and a descriptive analysis showed that the pre-service teachers were generally positive about the use of blogs, wikis and Zing (see Appendix 1). For almost all of our pre-service teachers this unit was the first time they had engaged with these technologies and therefore they still require much more time to realise its pedagogical potential. It is evident that even after a short period of time these pre-service teachers can at least "see" the potential.

Discussion and implications

The project has resulted in the redevelopment of a secondary teaching methods unit, so all pre-service teachers in 2006 participated in a learning program using technologies as a pedagogical approach to learning. We hope this unit served as a test bed and can become an exemplary model of ICT integration in teacher education programs. Our thinking on this matter is the subject of a paper given at the 7th International Conference on Information Technology Based Higher Education & Training in Sydney from 10–13 July 2006. As we worked with the pre-service teachers in the STS unit we became increasingly aware of the importance of modelling good technological and pedagogical practice around the use of technology. This has been very difficult in our university as it does not currently offer ICT systems and services that can support the use of wikis or blogs. Given this situation, we were forced to look for a hosted solution outside the university. There is a complex relationship between technical realities and pedagogical opportunities and there is a place for a more focused dialogue between the providers and users of ICT services. To date, the trend in universities has been towards monologic systems that promote a one-size-fits-all approach. While this approach is an understandable response in the current funding climate, it is one that severely limits innovation. The clear message is that universities must find ways of supporting both pedagogical and technical innovation. This is essential if they are to take a leading role in supporting school-based professional development and expand the knowledge-base that schools draw on when planning their ICT futures.

Based on our small-scale survey and pre-service teacher reflections, there is general support for the further investigation of the place of collaborative systems in teaching and learning. There is some concern from pre-service teachers about the technical support and continuing professional development required to effectively use these systems in the classrooms. Feedback from the classroom projects will help us better understand this challenge. It is our expectation that the classroom projects will also highlight the value of shoulder-to-shoulder professional learning with academics and pre-service teachers working in classrooms with teachers.

The project raised the profile of restrictive timetabling and scheduling environments in schools and universities for the development of effective partnerships. Originally we had planned a series of school visits prior to the pre-service teachers' formal field experience placements. Scheduling difficulties made this almost impossible — one school worked on an 11-day cycle and the other a 5-day Monday-to-Friday system.

This project raised awareness amongst some university staff of the importance of their own professional development. A number of teacher educators have invited the Project Leader to run special workshops for their pre-service teachers around these technologies.

We chose our partner schools in 2005 to allow us time to build a relationship. This proved very valuable but there was a disadvantage. When it came time to place pre-service teachers in schools we were not able to find placements, due to significant staffing changes in our partner schools, combined with our involvement of only STS Design and Technology pre-service teachers.

Schools need flexible and responsive ICT infrastructure that can respond to the rapidly changing Web 2.0 landscape. In particular, educators need computer resources to experiment with new technologies. In effect they need technological "sandpits" matched with online and face-to-face opportunities to share their experiences. While our partner schools appear to have more flexible approaches than many, anecdotal evidence across the sectors suggests that there is a need to remove some of the barriers to adoption that have been created by "locking down" computer networks.

The sustainability of collaborative technologies is possible as long as pre-service teachers feel that they have the support and commitment in the school setting to implement new ICT practices. Comments from pre-service teachers about the need for technical support, the prevalence of traditional methods, and relevance for future pre-service teacher will provide a challenge to sustainability.

There has been substantial interest in the ePortfolio model using the Elgg system in schools and across the university. The concept of having a professional portfolio that can be used to demonstrate teacher standards and capabilities and their development as professional teachers is certainly a legacy of this project. There has also been considerable interest in ways of engaging pre-service teachers in the use of social technologies. Recently the Project Leader has been involved in the development of a teaching and learning grant (i.e., Carrick Institute) across four universities that will consider how these technologies can help pre-service teacher exchange ideas and resources, while also providing a space in which they can create new ways of connecting with each other.

Given the challenges of the placement of pre-service teachers in our project, we did not have the opportunity to test the proposition that the practicum was the best place for addressing the challenges of ICT. Informal discussions with our pre-service teacher suggested that given the assessment issue, the practicum may not be the best place for pre-service teachers to undertake experimentation and innovation with ICT. This, combined with the expectation that practising teachers are required to build up to whole-class teaching activities, suggests there may be few "real" opportunities for them to foster collaborative learning.

Overall, the collegial approach fostered in this project has generated a high interest level in the use of collaborative technologies. The on-going practice, support and scaffolding provided by the Project Leader have resulted in learning opportunities and partnerships both internal and external to university.

Conclusion and recommendations

PICTL has been an exciting and timely study that focused on the consideration of learner-centred models of ICT use and integration, on models that promote pre-service teachers as producers not just as users, and on the encouragement of team learning not only individual learning. Because of the direction technology is taking (Alexander, 2006), and the increasing importance and relevance of team-learning to organisational learning (Senge, 1990), we believe these approaches have the potential to improve significantly ICT use in secondary education.

Questions of sustainability cannot be adequately answered in the short time frame of this project. It is our belief that there is "no going back" once the conversation has been started around collaborative technologies. Schools are facing the reality of a growing band of IT-savvy students and an ever-widening gap between home and school use of technology. The technological systems and models of pedagogy that school systems choose to promote will ultimately determine the future of ICT in education. The future is here. How we choose to distribute this future will be telling.

References

Alexander, B. (2006). Web 2.0: A new wave of innovation for teaching and learning? (2006) EDUCAUSE Review, vol. 41, no. 2, pp. 32–44. Retrieved 18 April from http://www.educause.edu/apps/er/erm06/erm0621.asp?bhcp=1

Dede, C. (2005). Planning for neomillennial learning styles. EQ Quarterly, 28. Retrieved 10 April 2006 from http://www.educause.edu/apps/eq/eqm05/.

Fitzgerald, R. & Findlay, J. (2004). A computer-based research tool for rapid knowledge-creation. Cantoni, L. & McLoughlin, C. (eds) World Conference on Educational Multimedia, Hypermedia and Telecommunications 2004(1), 1979–1984. [Online]. Available: http://dl.aace.org/15688.

MCEETYA. (2003). Research strategy: Learning in an online world. Melbourne: Curriculum Corporation.

MCEETYA. (2005). Pedagogy strategy: Learning in an online world. Melbourne: Curriculum Corporation.

Senge, P.M. (1990). The Fifth Discipline. New York: Currency Doubleday.

Wenger, E. (1999). Communities of Practice. Learning, meaning and identity, Cambridge: Cambridge University Press.

Appendix 1: PMI survey comments

Wikis

	Plus	Minus	Interesting
1	• Everyone has access to it • Easy to use — You don't have to study IT to understand how to use it • Room to edit	• It's hard to differentiate what is factual and what is not • Not good for student research (e.g. Wikipedia)/ information not conclusive	• People (anyone) can go into it and edit/make corrections • Anyone can put up any type of information in any form
2	• Wikipedia has proven that mass input will produce accurate information • Free		• Huge possibilities
3	• Collaboration without regard to time or place constraints	• Simultaneous updates clash — indeterminate results • Quality control is variable or non-existent	
4	• Worth exploring further the more I use	• Like many similar technologies a lot of steps, rules to learn • We don't really have much idea what it is capable of just yet	∑
5	• Dynamic, collaborative, has a sense of public ownership • FREE!	• Information accurate?	• How soon before it's bought and sold?
6	• Would be good to have groups of kids working on something together especially if they are remote from each other. distance education. Or a group of isolated small schools	• Poor ability to handle some formatting which leads to frustration • Seemed largely text based	
7	• Good for groups where projects can be edited by anyone at anytime	• Large scope for abuse. As it is able to be edited anonymously there is opportunity for petty sabotage	• If used properly can be great educational tool

Zing

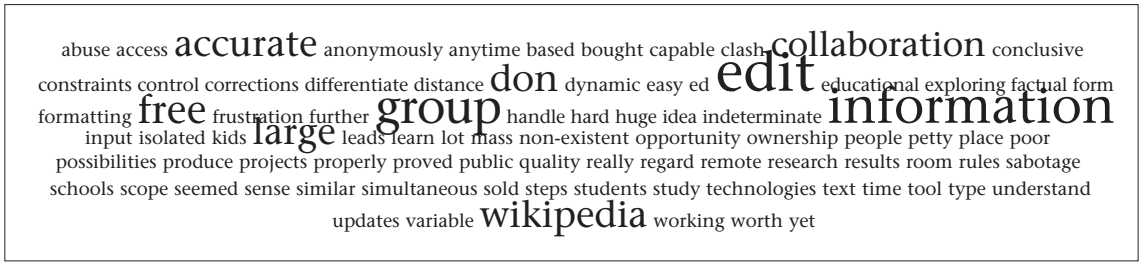
	Plus	Minus	Interesting
1	• Great way to introduce a structured/ informative discussion • Everyone has to participate… even shy students can have a go at it • Zing teaches students to work/brainstorm within a timeframe • Develops a thinking process which can be integral • Can monitor + censor conversations	• Easy to get off-track — constant supervision + penalties for non-relevant conversation is needed	• The timer is a good way to help the thought process • Structure is good
2	• Great for written collaboration and brainstorming • It changed to whole group dynamics for the better. Everyone seemed a lot more relaxed	• No graphic capability	
3	• All voices heard	• Experience replacement for butcher's paper	
4	• Lots of fun • Multiple users	• Can be abused • Too easy to get distracted	
5	• Fun, collaborative, fast and productive	• A bit ugly • Requires technology	• Has potential to be much better
6	• Lets people contribute without pressure of group	• Seems to be a lot of technology required	
7	• Gets people to voice without verbal communication	• Can get out of hand without close monitoring	• Good interface for a collection of information

Elgg

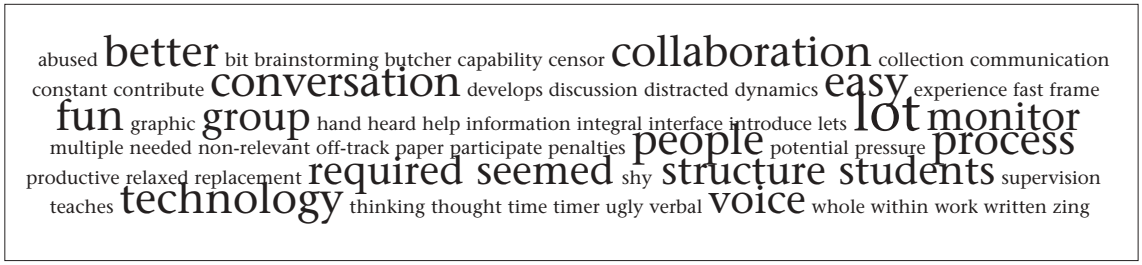
	Plus	Minus	Interesting
1	• Room to comment on other people's blogs • Feedback • Can attach files which are relevant to content in blog/profile • Creates a good understanding of people's personalities/interests	• Only a basic model of a blog site — restricting in the visual layout • To edit layout you can only choose from templates	
2	• Free and quite flexible	• A bit chunky • Interface isn't very exciting	
3	• Blog plus storage permanency	• Site hard to use • Primitive editor • No structure	
4	• Introduction to Blogs • Unlike many other systems it seems to have a lot more uses than the superficial ones we have seen	• Too many steps to learn at first	
5	• Good device for self expression • Creates a mini community • Fun • People can talk about themselves without being too public	• Ugly, hard to navigate and unwieldy	
6	• Very interesting way of showing information	• Complicated for techno inept	

Appendix 2: PMI Cloud Tags

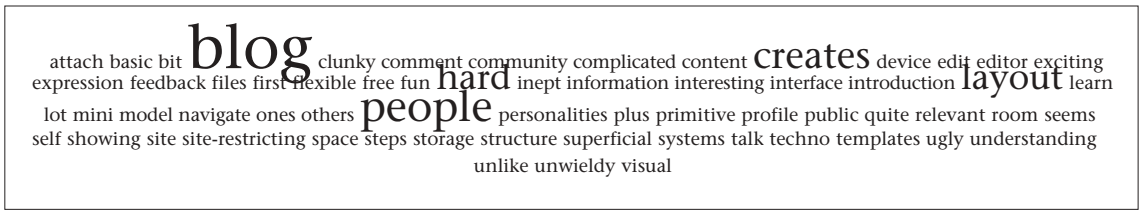
Wiki



Zing

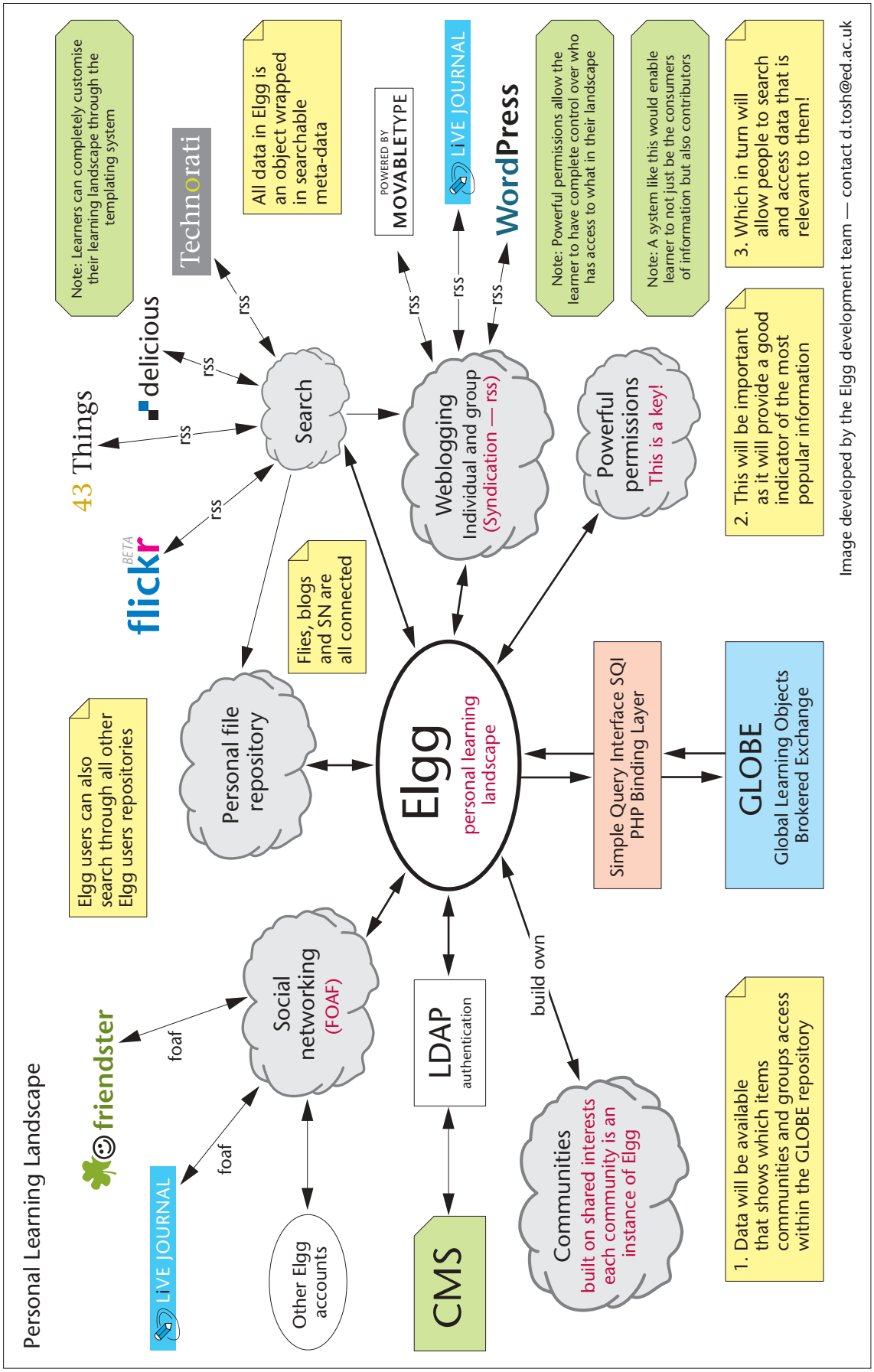


Elgg



Appendix 3: Elgg — a Personal Learning Landscape

Reference: see http://elgg.net/dtosh/files/83/226/elgg_roadmap.jpg)



Action! Learning into information literacy: A high-risk, high-gain investment strategy

REPORT FROM THE TASMANIA PROJECT

Andrew Fluck, University of Tasmania

Executive summary

The Tasmanian PICTL project focused upon co-construction of innovative ICT-based units of learning which were subsequently taught by pre-service teachers as part of their professional experience.

The quality of the unit plans was very high, a testament to the co-learning experiences of the supervising teachers and pre-service teachers. In many cases these exemplary unit plans were distributed to other teachers in the school for reference. This was an extraordinary outcome and indicative of the potential for cultural change using this methodology. Many of the learning experiences for students were innovative and transformative.

Recruitment of pre-service teachers into the project was extremely difficult. Pre-service teachers saw involvement in the project as a work overload, both during the planning stage and in the classroom implementation. Even though supervising teachers were allocated relief time to assist in the co-planning process, pre-service teachers balanced the demands of the PICTL activity against wage-earning opportunities.

The cases in this study imply that there are barriers to the integration of information and communication technology (ICT) into classroom practice which pre-service teachers are only somewhat able to surmount. Attitudinal barriers were adequately dealt with by the co-planning process, but infrastructural problems were not amenable to such techniques.

Local consequences have resulted in teacher training courses emphasising pedagogical approaches to ICT at an earlier stage and reducing focus on operational skills. The university has embedded ICT competencies of all kinds into general assessment criteria for professional experiences at all levels of the Bachelor of Teaching.

Implications for national consideration include the suggestion that a low-cost laptop be provided to every Australian child in Year 5 over a three-year period. An intervention of this scale is required to achieve a transformation of education through ICT.

Purpose of the project

Government schools in Tasmania are currently in the process of implementing the Essential Learnings curriculum framework, as are several Catholic and independent schools. This project focused upon the Communicating strand of this framework and, in particular:

> *Being information literate: Understands how to effectively access, interpret, transform, create, communicate, evaluate and manage information in ethical ways using a range of sources. <http://www.education.tas.gov.au/ocll/outcomeschart.pdf>*

Also, within the university, there is a mandate for all graduates to have problem-solving skills. This generic attribute encompasses the need for graduates to:

> *…have developed competencies in information literacy … Find, acquire, evaluate, manage and use relevant information in a range of media. <http://www.utas.edu.au/tl/supporting/ga/>*

The overall purpose of the project was to provide opportunities for pre-service teachers in the Bachelor of Teaching (a two-year end-on education degree) to collaborate on innovative ICT-based teaching designs with practising teachers. The focus for the university staff was to synthesise the generic attribute of information literacy in problem-solving with Information Literacy in the Essential Learnings Framework. It was anticipated that this would result in a strong framework for lesson and unit co-development in schools. Pre-service teachers would be involved in an action-research project with university staff and teachers, to use this framework to construct lessons and projects which they would implement while on teaching practice. The colleague teachers acted as critical friends and co-developers in the planning process and were also able to try new ICT ideas as they developed new approaches to curriculum.

Our target was to provide support for 15 of the 170 final-year pre-service teacher to engage in this process of co-construction. The following local questions were used to focus work in the project:

TRQ1: What was the take-up and persistence of in-service and pre-service teachers in this project? What factors did they attribute to their entry and maintenance of the project?

TRQ2: What in the view of the teacher participants were the unique student learning gains directly attributable to this project? To what extent did these learning gains represent achievement in the systemic curriculum framework?

TRQ3: Were the Embedding Educational Technology portfolios of participating pre-service teachers of significantly better quality than those of their non-participating peers?

The following research questions, adapted from the national PICTL research questions, were used in this local project to shape the data collection:

TNRQ1: How do partnerships between classroom teachers and pre-service teachers forward the agendas of curriculum reform in schools?

TNRQ2: What do the stakeholders believe are the barriers and critical success factors that impact upon the success of project strategic partnerships and how were they experienced and overcome?

TNRQ3: How did student work products illustrate achievement within the local curriculum framework and also signify transformation of the how and what of learning?

TNRQ4: What innovative approaches were used for professional learning by teachers, lecturers, in-service and pre-service teachers; and what were the indicators of their relative success?

TNRQ5: What recommendations would project participants make to develop innovative professional learning projects on a wider scale and what would be the value of these for students in schools, teachers, university staff and pre-service teachers?

Context

The University of Tasmania offers pre-service teacher training through a four-year Bachelor of Education degree and also a two-year end-on Bachelor of Teaching degree. This pilot project is aimed at first-year pre-service teacher in the latter program, who will enter the second year during the course of their involvement. There are currently 56 of these pre-service teacher based in Launceston and 162 in Hobart (200 km away). Primary, middle-school and secondary sectors are all represented in the cohort.

ICT training for pre-service teachers falls into two domains: operational skills and personal competence/confidence in the first year of the course, and applied pedagogical practice in the final year. A culminating performance in the final year is the accumulation in a portfolio of evidence based on the criteria in the Department of Education's Embedding Educational Technology (EET).

This context for teacher training in Tasmania involves a mixture of university-based education and school-based professional experience. The latter puts pre-service teacher into real classrooms under the supervision of a colleague teacher, and a university lecturer is usually able to visit them on a single occasion. The following diagram (Figure 1) compares the relative emphases of these components for those involved:

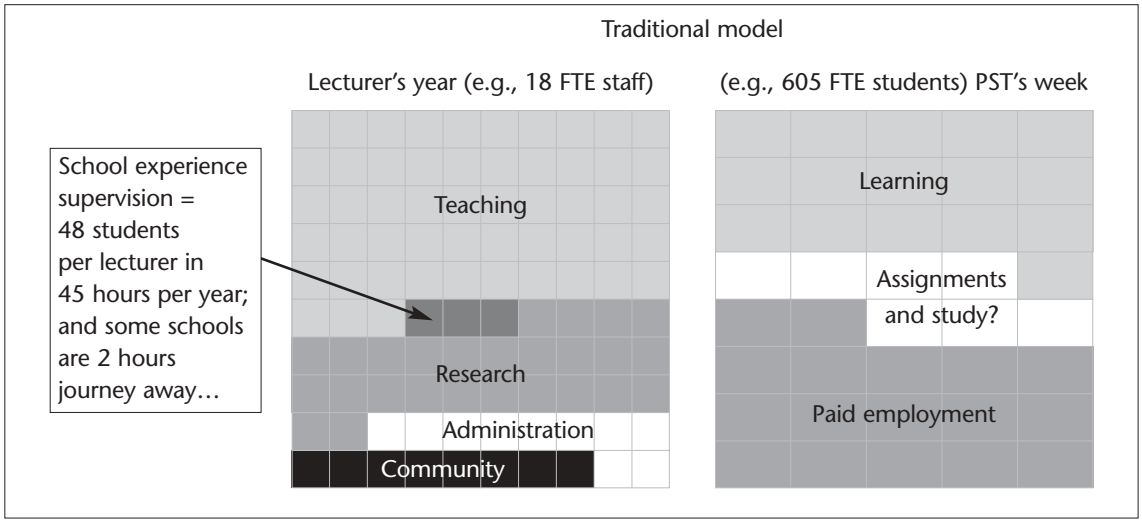


Figure 1. Pre-service teacher and lecturer time-on-task comparison

The diagram shows that school-experience supervision forms about 3% of the year's work for a typical university staff member, with less than an hour available for visiting each pre-service teacher, including travel. For pre-service teachers, training competes for personal time and paid employment. This tension is a major factor in their decision-making.

The PICTL project in Tasmania sought to use professional experience as an intervention strategy to address serving-teacher attitudes towards ICT and to provide quality-learning experiences for pre-service teachers. The overall context for the national PICTL study was:

> How can classroom-based professional learning projects be collaboratively designed to enable continuing and deeper professional conversations between teacher educators, teachers and pre-service teachers that focus on student uses of ICT within new curriculum reforms?

Partnership

The professional-experience partnership is based upon a formal agreement between the state government, the university and the Australian Education Union. Since the initial pre-service applicants were all allocated to government schools, the steering group consisted of university staff and a Department of Education representative. This group provided feedback to pre-service teachers and their collaborating colleague teachers about their unit plans.

It could not be said that there was an intensive collaboration equally involving all three partners in this project. Of necessity the major collaboration was between pre-service teacher and the colleague teacher, situated firmly in the classroom context. University involvement was through the review process and up to two consultative visits by the project director or a research assistant. This involvement appeared to be crucial in establishing the emergent ICT-based culture for classroom practice.

Project design

The project was designed from the outset to ensure pre-service teachers and colleague teachers were very well supported. The following timetable (Table 1) and Gantt chart (Table 2) show the steps involved:

Table 1. The structure of the project

What	When	How did it go?
Establish website and blog areas	Jul–Aug 2005	This was implemented in WebCT VISTA, the university's online content-management system. This was ineffective. Although special arrangements were made to roll it over from 2005 to 2006, colleague teachers in schools were not permitted to log into the site since they were not members of the university community.
Recruit pre- and in-service teachers	Sept–Nov 2005 and Feb 2006	The project received final approvals and the contract was signed just as the target pre-service teacher were completing their studies for 2005 and their classes with the project team had ceased. A directed poster campaign in Hobart and Launceston with a personal e-mail invitation gained initial responses from 10 pre-service teacher. The campaign focused on the benefit of having time release for colleague teachers to assist in planning for the School-Experience period. Honours classes and other obligations culled this initial cohort.
Supple-mentary recruitment	Mar 2006	When classes re-started in 2006 the project team used lecture time to demonstrate the progress of the remaining PICTL pre-service teacher and recruit more. An additional five pre-service teacher joined the project. However, two discontinued because of the remote location of their placement school and Honours commitments.
Collaborative planning between pre- and in-service teachers	Oct–Nov 2005 and Mar 2006	Pre-service teachers were able to access a small amount of money to pay for additional planning trips to their School-Experience placement schools ($150) and colleague teachers were provided with two days of relief to facilitate the collaboration. The emphasis was upon teaching through ICT and Being Information Literate, not about ICT per se. Innovative and transformative applications were preferred (learning activities which demonstrate how ICT can change both the content of learning, as well as the how/where of student learning).
Plans completed and reviewed by project team	Jan–Mar 2006	Pre-service teacher e-mailed preliminary unit plans to the project team who commented upon them and returned them for development. The project Research Assistant visited each collaborative pair to gather data about the nature and success of the process.
Plans put into action in School Experience classrooms	20 March to 13 April 2006	School experience was four weeks long.
Observation of action learning and feedback from project team	Nov 2005, Mar–Apr 2006	The project team had supported the diverse range of PICTL pre-service teacher through the planning process. As planning turned to implementation, the Research Assistant and project team were able to visit schools and observe student participation and learning products.
Data analysis and reporting	Apr–May 2006	In progress… One of the expected outcomes was improved quality of pre-service teacher Embedding Educational Technology portfolios. These are not due for submission and assessment until 9 September 2006.

Table 2. Timeline

	2005						2006				
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Establish website and blog areas											
Recruit pre- and in-service teachers											
Collaborative planning between pre- and in-service teachers											
Plans completed and reviewed by project team											
Plans put into action in School Experience classrooms											
Observation of action learning and feedback from project team											
Data analysis and reporting											

The project was initiated at the end of the academic year and linked to the following year. This context and the relationship between the project planning and the programmed learning activities for the Bachelor of Teaching pre-service teachers was significant. The project initiation occurred at a time when the prospective cohort of pre-service teachers was not available for mass-scheduled lectures, and was at the end of an ICT training process which focused upon operational skills assessed by in-class timed tests.

The linkages are expressed in Figure 2.

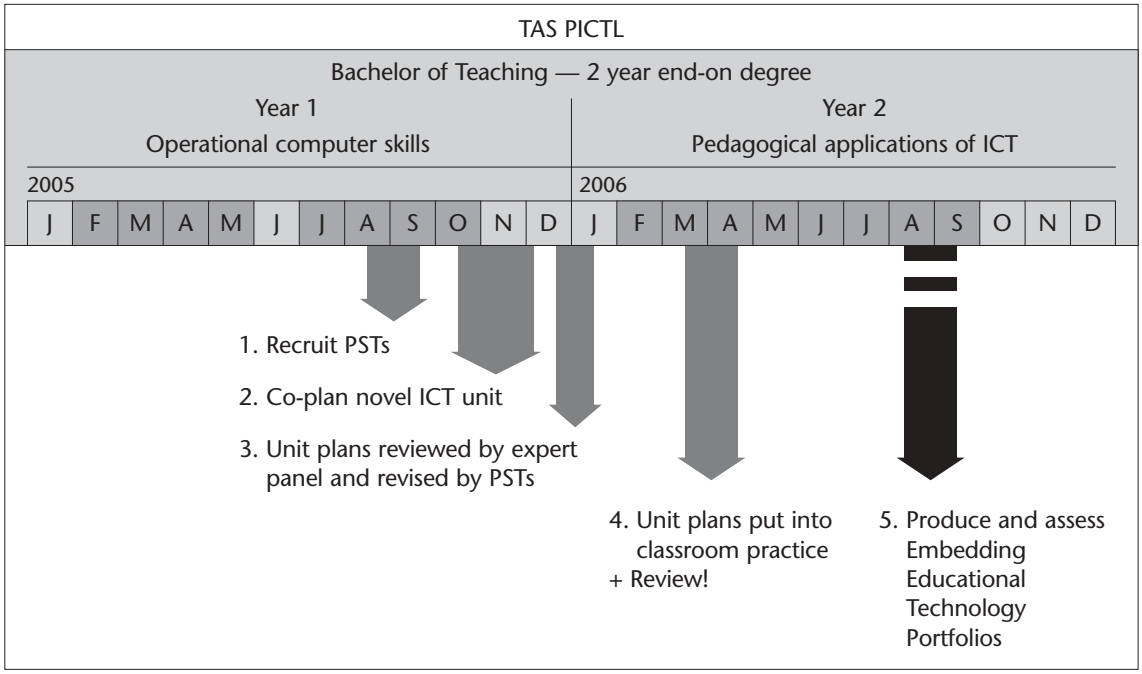


Figure 2. Tasmania's PICTL project

Noticeable is the asymmetry of the semester structure for this degree. This is because the second semester of the final year commences within a fortnight of the first, enabling graduates to work in Tasmanian schools for the final third term of the year and thus accelerating their entry into the profession. It exacerbates the competition between these graduates and those from the Bachelor of Education: approximately 160 from each course vie for about 50 Tasmanian jobs (although number of jobs is increasing).

Also noticeable is the emphasis on ICT teaching in the two years of the course. We were recruiting pre-service teachers at the time when their training had concentrated on operational computer skills, but we were asking them to take a lead in pedagogical applications.

The pre-service teachers who participated in the PICTL project came from a variety of backgrounds and from different sections of the training program. Their involvement spanned the entire K–12 spectrum and they co-planned units of learning from a large number of subject areas. Table 3 illustrates the diversity of age-levels, geographic placements and key ICT focus areas.

Table 3. Summary of PICTL pre-service teachers

School (pseudonyms used throughout)	Distance from campus (~kms)	Pre-service teacher Year Level	Unit topic	Key ICT concepts
Hillside College	2	11/12 Biology	Rocky Shore Ecosystem Study	Digitisation of an entire unit including a virtual field trip.
Lincoln District	38	3/4	Are rules worth having?	Using ICT to promote understanding and participation in democratic decision-making processes and civic life.
City Private	2	8/9 Art	Who Am I?	Composite Narrative (self-portrait)/ Self-image using GIMPShop.
Grassy District	52	Kinder/Prep Technology	Twin Big Book	Using electronic messaging to connect with an overseas twin class; send travel buddy; collaborate to create a digital Twinning Big Book; exchange a podcast or vidcast.
Shot-Tower Primary	15	5/6	Improving urban children's awareness and understanding of the links between agriculture and their lives	Critical awareness of information on the world-wide-web.
Catholic College	7	9 Materials Design Technology	Produce commercial grade packaging for their wooden jewellery	Use ICT to gather marketing information about the timber used in the jewellery, and image manipulation software to create suitable packaging.

The take-up of the project by in-service teachers was 100% for those approached. Generally, schools were supportive of this innovative approach to school experience. The Tasmanian context is typified by a high demand for pre-service school experience placements and a large number of schools were unwilling or unable to accept pre-service teachers. Staff turnover in schools is annually very much lower than the numbers of teachers graduating from the local Faculty of Education. Payments to supervising (colleague) teachers are generally low (they have not changed for 15 years) and therefore the PICTL promise of two relief days per pre-service teacher made the placement much more acceptable from each school's perspective.

The take-up of the project by pre-service teachers was very low. For those who participated there were several costs and risks. From the point of view of the pre-service teacher, passing the practicum was the most important activity. Additional engagement beyond this represented wasted effort which had to compete with virtually full-time work to pay for food and rent and in many cases, substantial pre-existing family responsibilities. The view of non-participants was that "it looked like too much work". One participant remarked: "It was a lot more work than I had anticipated."

The ICT context within the Bachelor of Teaching should be noted. Since all entrants to the program have a first degree, the ICT training component is arranged in two parts. The first year's activity brings pre-service teachers to a high level of personal operational competence and, it is hoped, confidence. This skills training covers advanced word processing, image manipulation, spreadsheets, website construction and video editing, etc. The pre-service teachers were initially approached to enlist in the PICTL project towards the end of this training, which is assessed by compulsory in-class tests. The second year ICT training focuses upon its use as a learning tool for students and culminates in the development of a portfolio of evidence based upon the Embedding Educational Technology unit from the Department of Education. This evidence is gathered from in-class teaching activities and is predicated upon student learning enhanced by ICT.

Therefore, the pre-service teacher cohort was recruited when they were between these two contrasting views of ICT in their professional lives. It must be stressed that this view of ICT, i.e., being above and beyond normal teaching practice, represents one of the most significant barriers to pre- and in-service curriculum transformation. Similarly, perceived infrastructural deficiencies in schools appear to remain a substantial reason for the slowness of adoption.

Data collection and analysis

Data were collected for each of the research questions by the project personnel. In line with national privacy principles and assurance of anonymity of the research participants, this evidence was to be accumulated in a project web-space, with access limited to project participants and the project team [as noted above, the lack of digital access rights for colleague teachers prevented this aspect of the project information sharing]. Prime sources of evidence were:

a. draft unit work plans emerging from the collaboration process between pre-service and in-service teachers before the end of Term 3, 2005 (using schedule in Appendix 1);
b. observations by the research assistant during Term 1, 2006 (see Appendix 2 for a sample);
c. focus group interviews with students;
d. interviews and reflective diaries from in-service teachers and their immediate management;
e. reflective feedback from a critical friend (Appendix 3).

Results

Results from the project are summarised below under each of the local and national research questions.

TNRQ4: What innovative approaches were used for professional learning by teachers, lecturers, in-service and pre-service teachers; and what were the indicators of their relative success? See Table 4 and Table 5.

Table 4. Example outcomes

School	Example outcomes
Hillside College	There is a virtual field trip to practise identifying species and counting examples within quadrats and a chat room to facilitate inter-student communication. Both these ICT techniques are novel to the colleague teacher. Assignment submission online replicates "the real world".
Lincoln District	There has been a lot of co-learning between the colleague teacher and the pre-service teacher. This "understanding democracy" project breaks new ground, e.g. the children will operate the digital and video cameras themselves, not the teachers as per normal. The draft unit plan is shared with all the Year 3/4 teachers (3 total) and they are all using elements of it. This is highly unusual.
City Private	The colleague teacher rarely uses IT in her teaching. At this school teachers are expected to purchase their own laptop. This is the colleague teacher's second year at the school and she is yet to buy a laptop. This exercise involving the Internet and ICT in Creative Arts therefore breaks new ground in a major way.
Grassy District	One of three computers for 21 students is reserved for a child with special educational needs. This is the first time the colleague teacher has done a podcast or collaboratively planned a digital big book; she is the "computer coordinator" for the school. This project is novel for this school. There has never been a whole unit based on an ICT focus. It is expected that some other classes may adopt such an approach following the successful outcome of this project. The unit plan was distributed to all staff before the teaching was started.
Shot-Tower Primary	The topic chosen by the PICTL pre-service teacher is one that the colleague teacher would not have considered independently, and some of the resources, e.g., Women in Agriculture, were new to her. Two of the four computers in the classroom are virtually dedicated to individual students with special educational needs.
Catholic College	The project will use the school computer laboratory to support Materials and Design Technology using software the colleague teacher was unaware of.

Table 5. Summary of success

	Transformation	Innovation
Hillside College 11/12	Time and place of learning	Virtual field trip
Lincoln District 3/4	Same day reflection	Pre-service teachers plan shared with peer teachers
City Private 8/9	Photographic manipulation	Culture change in the Art area of the school
Grassy District K/P	Overseas link to create Big Book; podcast	The pre-service teacher plan was distributed before implementation to all staff
Shot-Tower Primary 5/6	Students e-mailed farmers	Restricted computer access
Catholic College 9	Integrated research and package creation	Colleague teacher now aware of ICT potential

TRQ2: What, in the view of the teacher participants, were the unique student learning gains directly attributable to this project? To what extent did these learning gains represent achievement in the systemic curriculum framework?

It was difficult to gather data directly responding to this research question since the school-experience period was only drawing to a close as this report was being written. Therefore, any processes for formal assessment were roughly coincident or after the research assistant's classroom observations. The notes (Table 6) illustrate the range of colleague teacher responses to the PICTL project activities.

Table 6. Colleague teacher reflections on gains in learning

School	Colleague teacher reflections
Hillside College	Students started their virtual field trip. During the lesson most of the teachers in this teaching area spent some time in the class observing the program and the students.
Lincoln District	
City Private	The colleague teacher found the use of ICT very effective for teaching this unit of work. The tool was very effective for students who have difficulty drawing. She now plans to integrate some ICT into her teaching. She made the comment that her experience with the PICTL pre-service teacher has given her the confidence to utilise ICT herself.
Grassy District	
Shot-Tower Primary	Some students e-mailed a farmer with questions they would like answered. A difficulty with this was the time delay in sending an e-mail and receiving a reply.
Catholic College	The colleague teacher commented on the wonderful time she had experienced with the PICTL pre-service teacher. She found the pre-service teacher's use of ICT to be very informative and was very impressed with the effectiveness.

TRQ3: Were the Embedding Educational Technology portfolios of participating pre-service teachers of significantly better quality than those of their non-participating peers?

Since these portfolios are not assessed until much later in the year, it is not yet possible to provide an answer to this research question.

TNRQ1: How do partnerships between classroom teachers and pre-service teachers forward the agendas of curriculum reform in schools?

It was clear that the success of the project activities could only be measured with respect to local cultural norms. In some cases the pre-service teacher worked with the school's pedagogical ICT champion, and was often enlisted as a promotional resource to legitimise putting computer applications at the focus of a unit of work. In other cases the colleague teacher was "computer-phobic", which demanded particularly diplomatic skills on the part of the pre-service teacher.

In many of the Tasmanian PICTL schools, the study planning and implementation were widely shared outside the actual classroom in which the teaching was conducted. In this sense then, the PICTL project demonstrated the possibility of effecting significant cultural change far beyond the scope of the personnel involved.

TNRQ3: How did student work products illustrate achievement within the local curriculum framework and also signify transformation of the how and what of learning? Please see Table 7.

Table 7. Student achievements

				KITO modes and levels					
School	Bloom's Taxonomy	Year level	Expected KITO level	Operations	Publishing	Communicating	Researching	Problem solving	Independent learning
Hillside College	Analysis	11/12	8	6	6	6	5	5	
Lincoln District		3/4	2						
City Private	Application	Standard 4	5–6	4–5	4		5		
Grassy District		Kinder/Prep	0						
Shot-Tower Primary	Compre-hension	5/6	4	2–4		3			
Catholic College	Application	9	6	6	5–6		5		

Final assessment and marking with respect to the Essential Learnings framework was not completed by the time of writing. Nevertheless, the table above shows that students were largely observed working within the expected range for the KITOs (similar to the emerging National Curriculum Consistency Outcomes) framework, except for the older age group.

In terms of transformation, this once again needs to be judged according to local cultural norms. The virtual field trip at Hillside College, together with the digitalisation of other coursework components such as real-time chat and bulletin-board assignments, made non-traditional off-campus participation possible. The "digital street rules walk" at Lincoln District would not have been feasible without digital cameras and the capacity to instantly download photographs into computers upon returning to the classroom. The ambition to create a podcast at Grassy District was a novel use of ICT, (especially for such a young group) but imminently feasible.

At City Private there was a local transformation (bringing digital media into the Art area) but this would not be unusual in many other schools. A similar judgement might be made of the activity at Catholic College, where ICT was used in a novel way for that school, but was not unusual elsewhere. Similarly, much of what was done in Shot-Tower Primary was similar to the research-and-publish activities common in other schools.

Thus, half the projects produced transformative pedagogies at the national or state level, whilst the other half were transformative at the local school level. In every case pre-service teachers were studying material or using methods which had not previously been available to them in their school.

Discussion and implications

Locally

The major issue for the project team to deal with was the extreme difficulty in recruiting the target of 15 pre-service teachers. We barely managed half of that from a cohort of 170. Much of this difficulty appeared to result from the belief of pre-service teachers that ICT was an additional aspect to classroom practice rather than an integral part of good teaching.

Why did they have this understanding of ICT as an "extra"? It is possible that there are four reasons:

1. ICT was not integrated into the breadth of the pre-service training program, except as a delivery and communication mechanism;
2. ICT in the first year of the program was essentially skills-based, and separate from the pedagogical curriculum and methods units;
3. Pre-service teachers had not been exposed to many good classroom ICT experiences before the project recruitment phase;
4. ICT was not a pervasive experience for these pre-service teachers during their own school education.

Nationally

TNRQ2: What do the stakeholders believe are the barriers and critical success factors that impact upon the success of project strategic partnerships and how were they experienced and overcome?

At a national level we suspect that the *gross* imbalance of ICT provision between home and school (except in a few laptop schools) will continue to adversely influence the perceptions of teachers and students.

Conclusions and recommendations

Sustainability

As suggested in the sub-title of this report, the gains generated by these collaborative partnerships exceeded the expectations of participants.

However, for the pre-service teachers who participated, there were considerable costs and risks. In cases where a pre-service teacher enlisted in the activity but where the colleague teacher could not participate satisfactorily, the PICTL project quickly failed. From the point of view of the pre-service teacher, passing the practicum was the most important activity. Additional engagement beyond this represented wasted effort which had to compete for time with virtually full-time work to pay for food and rent, and in many cases substantial pre-existing family relationships.

The full cost of sustaining a single collaborative partnership using this model was considerable (see Table 8).

Table 8. PICTL pre-service teacher costings

Pre-service teacher travel	$150	
Colleague teacher relief days	$672	
Research Assistant visits	$120	
Expert review of draft unit plans and action learning inputs	$200	
Payment to colleague teacher (20 days @ $12)	$240*	* NOT paid by PICTL
TOTAL	$1382	

This cost has to be compared with the total cost of paying colleague teachers for supporting pre-service teachers. These payments are of the order of 90 days @ $12 = $1080. This single professional experience therefore costs far more than the practicum for an entire program. We estimate that similar outcomes could be obtained for half the costs incurred by PICTL in a subsequent year, following the success of this initial pilot. Long-term sustainability is marginal in the Tasmanian context because of the shortage of school-experience placements and the time it may take for changes in process to have ICT accepted as a normal part of classroom teaching practice.

TNRQ5: What recommendations would project participants make to develop innovative professional learning projects on a wider scale and what would be the value of these for students in schools, teachers, university staff and pre-service teachers?

The project team made a range of recommendations directed at inculcating cultural change with respect to classroom use of ICT. Some of these have already been implemented locally, and this is noted.

Recommendations for pre-service and professional learning programs

1. Emphasise pedagogical applications of ICT rather than operation skills in teacher education programs.

   In the University of Tasmania Bachelor of Education program, pre-service teachers are given an ICT skills test on entry. This is based upon the exit test devised for UK teacher graduates <http://www.tda.gov.uk/skillstests/practicematerials/ict.aspx>.

   Pedagogical approaches to ICT as a teaching tool are therefore brought forward in the program so that pre-service teachers are made familiar with classroom applications and techniques at an earlier stage.

2. Equip pre-service teachers as cultural change agents prior to their final year.

   From the PICTL project it was apparent that pre-service teachers experienced, at the very least, internal conflict. Their priority is to PASS the professional experience component of the course, and therefore they regard themselves as learning from, and being directed by, their colleague teacher. The PICTL project encouraged them to take a co-construction approach, at variance with the normal relationship. If this process is extended, then the pre-service teachers will need to be prepared to cope with the conflicting demands of being a learner in a situation where they are also acting as a cultural change agent.

3. Embed ICT criteria into all general School-Experience assessments.

   This has been done at the start of 2006 for the University of Tasmania Bachelor of Teaching program from which PICTL pre-service teachers were drawn (see Appendix 4). This approach conveys a message to pre-service and colleague teachers alike, that ICT is an integral part of the learning-teaching process. In an age where many states and territories are issuing serving teachers with laptop computers, there is real pressure on teacher training institutions to prepare new entrants to the profession in similar fashion. If assessment continues to drive learning, then this is a strategic move which could be effective in changing cultural attitudes in the classroom.

4. Persist with the TAS PICTL model in a more sustainable form, using 50% funding. Work on envisioning this co-learning as a benefit, not an overload.

   This model was expensive on a per-pre-service teacher basis. If the project had been better timed, (i.e., introduced at the start of the academic year, with implementation in the second half of the same year), then we expect uptake to have been much improved and the need for incentives reduced.

5. Liaise with schools and systems to ensure pre-service teachers receive digital access rights.

   In several cases PICTL pre-service teachers were not able to access the school ICT infrastructure without considerable negotiation. In the Tasmanian state system, teachers have laptops (pre-service teachers generally do not) and access digital materials through the eCentre <http://www.ecentre.education.tas.gov.au>. This is a portal for most eLearning materials and curriculum framework documents. To prepare for an ICT activity, teachers also need to be able to log in as a student.

6. Provide an OLPC laptop for all Year 5 students across Australia from 2007 to 2010 <http://laptop.org/>.

   In many classrooms, ICT is a disruptive technology because of its unreliability and comparatively low levels of access (particularly compared to that in most students' homes). Australia needs to address the gross imbalance for most students between home and school ICT environments by funding an OLPC laptop or similar for all Year 5 students across Australia from 2007 to 2010. The estimated cost of such an initiative would be AU$141m, including a national centre for disseminating good practice in relation to consequential massive curriculum implications. By positioning this initiative at Year 5, subsequent familiarity would be embedded in Year 6. All students from Year 7 onwards could be taught with ubiquitous ICT as a given, not as a disruption. From the PICTL project it is clear that in-school curriculum change and cultural change requires this level of intervention.

Appendices

Appendix 1: Data gathering when observing a lesson within the ICT-focused unit of work

Lesson observation: Time/events log

This should be completed during the lesson.

School: Year level:

Date: Teacher:

Lesson (subject/ELs area): Observer:

Theme of lesson:

Key to activity codes:

1 = Whole class interactive (teacher directed); 2 = Whole class lecture; 3 = Individual work; 4 = Collaborative/group work; 5 = Classroom management; 6 = Testing/assessment

Time	Activity code	Description of activities in the classroom	Aspect

End of lesson

1. Level in Bloom's Taxonomy where most students spent most time:
   Knowledge Comprehension Application Analysis Synthesis Evaluation
2. KITO cell in which most computer-based student activity took place:
   Level: 0 1 2 3 4 5 6 7 8 8+

   Mode: Operations and Computer components Publishing Communicating
   Problem solving Independent learning.
3. Other comments (preparation, resources, ICT reliability, classroom management etc).

Appendix 2: Example of observations by the research assistant (Karen Wilson) during Term 1, 2006

Karen has organised some really interesting IT experiences to support the topic she has been given. She is working in biology and her teaching revolves around the students' first field trip for data collection, followed by a written report.

Karen has planned a virtual field trip, an "in-school chat room" that is compulsory to visit and post something on. Some supporting research must come from the net and the report must be submitted electronically.

Computer access within the college is very good. There is a laboratory in the same area as the classrooms and students have easy access to library computers out of class time.

Karen was meeting with the IT Tech after our meeting and planned to show/discuss her lesson plans with the teacher later in the week. I raised a couple of points which I doubt had been considered, e.g.,

- ensuring that the students can access the site and manipulate it as she is expecting. I suggested that she ask for student log on as well as a staff log on.
- advance warning to the IT staff of her requirements.

Karen had not given much thought to the unique learning experience that the use of ICT would give the students, nor had she considered how she would measure the effectiveness of the ICT. We spent some time exploring possible options. I'm hoping she and the teacher will discuss this further when discussing her program. I have asked her to e-mail some dot points, but I'm happy to visit her again if she would prefer.

The use of the virtual field trip and an in-school chat room are tools that the teacher has not previously used in this subject. He seems really interested in seeing the outcome of using these tools.

Appendix 3: Reflective feedback from a critical friend (Dr Margaret Robertson)

Action! Learning into Information Literacy

A research partnership between:

- Faculty of Education, University of Tasmania
- Department of Education
- Bachelor of Teaching pre-service teachers
- Catholic Education Office

Project aims

The Action! Learning into Information Literacy Project aimed "to explore curriculum renewal through action learning by pre-service teachers in collaboration with colleague teachers. The project explored curriculum renewal through action learning by pre-service teachers in collaboration with colleague teachers". For university partners: "The focus for the university staff will be [was] to synthesise the generic attribute of information literacy in problem solving with Information Literacy in the Essential Learnings Framework [Tasmanian Schools Curriculum]."

What did the project achieve in terms of its stated outcomes?

Subsidiary

Slow to start because of the timing of the project in relation to the scheduled school-experience dates. Pre-service teachers involved in the project have made significant achievements in recent times. Agreements were made for projects to be conducted during school-experience period 20 March to 14 April 2006. There have been seven pre-service teaches involved. All are enrolled in the Bachelor of

Teaching course — a two-year degree following the completion of an undergraduate degree. Pre-service teaches have conducted their action-learning projects in a variety of school contexts including primary, secondary, senior secondary and non-government schools.

On the criterion of adaptability to a variety of contexts the project has been highly successful. Each project commenced as a draft concept which was subsequently modified to reflect reviewers' comments and school-based contexts including ICT infrastructure and support. Projects were designed to reflect both ICT literacy requirements and those of an additional curriculum content area. These included democracy, civic duty and decision making; biology in the senior secondary context; image based identity; and pen pal podcasts.

Interviews conducted by a casual Research Assistant and the Project Leader, Dr Andrew Fluck, provide ample evidence of reflection and well-considered collaborative planning, including aspects of the teaching and learning that could be directly attributable to ICT.

Independent interviews conducted with pre-service teachers in the evaluation of this project suggest the strategy has worked well. Support for the teachers through relief was a crucial element in the success of the project. This enabled pre-service teachers to work through the practicalities of their sometimes-ambitious ideas and provide time for the colleague teacher to develop the appropriate classroom environment for the project to occur.

What have been the critical moments within the project?

Timing

There appear to have been major hurdles at the beginning of the project. Project funding came too late for the School-Experience program in 2005. This meant recruitment of pre-service teachers in 2005 was reliant on meeting the project needs in 2006 — the second year of their course. The continuity of arrangements both between the University of Tasmania and schools and within the recruitment of pre-service teachers was complicated by the need to bridge two academic years. The project leader and the pre-service teachers were involved in duplication of processes and more additional work than would have been necessary if the project had been set up and completed within the same academic year. Nevertheless, and to the credit of all concerned, enthusiasm has facilitated good outcomes.

Planning

The collaborative planning session prior to the school-experience period early in 2006 was possible with two days relief time for the teachers in schools. For example, the pre-service teacher's podcast project had the potential to fail without adequate teacher input. Expectations of the learning potential of the prep/grade 1 class involved were high. During the planning time the pre-service teacher was able to make adjustments to suit the capabilities of the children. In brief, both teachers and pre-service teachers learnt a great deal during this quality time away from the classroom.

Feedback

Ongoing feedback on the success of the project via e-mail has provided the necessary support for both teachers and pre-service teachers. The University of Tasmania Web Vista site established for the unit was not effective because access was denied to the colleague teachers.

How has the project been steered and managed?

The project has been managed by representatives of two of the partners: Andrew Fluck (Lecturer in ICT) from the University of Tasmania and Janine Bowes (Principal Education Officer Online Services) from the Tasmanian Department of Education. An experienced teacher has conducted some of the data-gathering through classroom observations and teacher and student interviews.

Funds have been managed within the University of Tasmania's Faculty of Education.

How did the consultative mechanisms operate?

Once the initial negotiations were conducted, e-mail appears to have been the major consultative mechanism. School-based visits by a Research Assistant and the Lecturer-in-Charge have augmented these contacts where necessary, as have face-to-face pre-service teacher to lecturer contacts.

As stated previously, the Web Vista site was not fully utilised. While pre-service teachers had access by virtue of their formal University of Tasmania course enrolment, the teachers involved were excluded from access.

How effective has the infrastructure been?

The most notable observation in the reports appears to be the difference in the school contexts, the teachers' skills and ICT competence. The following three examples illustrate the dilemmas.

In one non-government school where there is a laptop program for students, teachers are required to purchase their own laptop. In this case the teacher was in her second year at the school but reputedly had not yet made such a purchase. The interview data reports that both the teacher (of Art) and the school did not seem to be well equipped (or organised) with ICT access or relevant software. Nevertheless, there appeared to be a willingness to "go along with the project" with good IT support on hand.

The second example relates to a secondary school. In this school the pre-service teacher worked with the IT support teacher. Her chosen theme/teaching strategy relied on ready student access to computers. In the classroom where she was working there were four computers. For most of the time allocated the computers were used by special-needs students. Alternate access was possible, but needed to be organised, and this involved students leaving the class.

The third example relates to a small rural K–10 school. In the classroom involved, the pre-service teacher and teacher of Prep/Grade 1 had access to two computers plus one touch-screen computer for a student with muscular difficulties. Despite the fact that their IT support is dependent on weekly visits, the connectivity appeared to be good and reliable.

In brief, the success of the project relied on overcoming a number of local contextual hurdles and barriers related to teacher attitudes, school governance, IT policy and access.

How effective has the framework for the site-level projects been?

Interview and observation data suggest that the framework has been successful. Each of the seven pre-service teachers involved received support funding to the equivalent of $1000. The Research Assistant was employed for 32 hours, and travel funding was provided for pre-service teachers to attend planning meetings with colleague teachers.

What methodologies of practice has the project adopted and were they appropriate to the project's objectives?

The project relied on volunteer pre-service teachers. Although more indicated interest the final number able to meet the requirement during the specified time was seven.

Once negotiated, and the terms of the project understood, school-based data-gathering involved a Research Assistant who was employed for four hours per pre-service teacher. Duties included meeting with the pre-service teacher and colleague teacher to assess the "co-learning", in-class observations for one hour, and write-up and analysis of findings.

In-school interviews conducted with the pre-service teachers and colleague teachers have been transcribed and appear to provide a comprehensive overview of how well the project has met its stated aims. Transcripts of these, along with planned interviews with Dr Fluck (ICT lecturer in the Faculty of Education), inform this evaluation report.

Interviews conducted used an open-ended question approach based on four main questions. Questions related to teacher perceptions of how well the student learning gains could be "directly attributable to this project", the partnerships observed, "innovations" using for professional learning and stakeholder perceptions of "barriers" and how these were overcome.

Classroom observations involved making an assessment of the type of activity such as individual or collaborative work, level of operations (based on Bloom's taxonomy) and ICT-specific student activity or outcome (KITO).

What is the likely "legacy" of the project?

As an observer and evaluator of this project I believe the signs are very positive. The basis of the project works on the principle of creating a sense of community between the stakeholders. Shared meanings negotiated at the beginning enabled both pre-service teachers and teachers to engender a sense of ownership of the outcomes.

Perhaps this was most apparent in the primary-ECE area where both teacher and pre-service teacher are together for most of the day and have the opportunity for more incidental learning. I was struck by the gap that the initial discussions exposed in the teachers' readiness for this project. Under the usual School Experience arrangement this may have persisted. However, with access to good shared planning time, expectations, including aspirations, hurdles and barriers to be overcome, could be identified and rectified. The interview data reveal a number of instances of the teacher becoming the learner in the process and the school benefiting more broadly with the sharing of outcomes.

Hence, one "legacy" of the project is to highlight the strength of the collaborative planning mechanism. Given that the development of ICT literacies is a 2006 funded curriculum priority for Tasmanian education, the project was timely and appreciated in schools.

Another "legacy", or perhaps unexpected outcome can be observed in the ways in which the pre-service teachers' initiatives have assisted innovations in the schools' ICT learning plans. One obstacle that this project has brought to attention (not new to this study) is the manner in which teachers can sometimes find ways to set aside ICT-related learning or involvement of new technologies "because the kids have already done that at home or in previous classes". Perhaps as an admission of personal inadequacy, and sensing the superior ICT skills of students, this "excuse" could be argued as disguising a real need for support. In this sense the collaborative planning at the beginning of the process was able to off-set these feelings and encourage the teachers to participate in the co-learning environment as well as accepting ultimate responsibility.

Another dimension to this sense of adequacy is the way in which we can come to regard the capabilities of children and adolescents. In the rural school included in this project, the pre-service teacher working with a Prep–Grade 1 class had to overcome two additional barriers. This is a high needs school where home access to computers is below the average, and a case where the digital divide argument could be made. However, perhaps because the community is small and there seemed to be parental interest in the pod-casting project, the pre-service teacher quickly bridged any initial skill gap. As well, the pre-service teacher was able to observe the children's rapid visual-spatial development with the computer mouse. They were quick to learn and made observations that impressed (or surprised) their teacher.

What advice, if any, should be given about future actions, projects and partnerships?

Timing of the project has been a problem, given the late start of the project in the academic year. Pre-service teachers in the 2005 enrolment had already completed their school placements. In the Tasmanian project it was fortunate that the pre-service teachers were in their first year of a two-year course so were able to maintain their interest in becoming involved.

The professional-learning model is time consuming and perhaps costly given the teaching relief involved. However, there are clear signs that the organisational benefits are high. Capacity building of teaching staff is crucial for the adequate take-up of ICT in school education. Furthermore, the model is clearly designed to enable opportunities for the enhancement of student learning in collaborative ways that build on their existing skills.

Appendix 4: Criteria for assessing pre-service teachers' performance during professional experience (UTAS BTeach)

(Embedded ICT elements have been highlighted)

	1. Using and developing professional knowledge, practice and values	2. Communicating, interacting and working with students and others	3. Planning and managing the teaching and learning process	4. Monitoring and assessing student progress and learning outcomes	5. Reflecting, evaluating and planning for continuous development
Professional experience 1	• Complies with professional standards in relation to hours of attendance and personal presentation • Demonstrates an awareness of school structures and policies • Demonstrates a willingness to listen and learn • Demonstrates an awareness of the diversity in a school community • Work is well presented and prepared in a timely manner	• Communicates confidently with peers, colleagues and students • Gives clear, simple directions to students and makes sure they are understood • Demonstrates an awareness of effective use of voice • Learns student names • **Uses ICT appropriately to communicate with peers and colleagues** • **Supports students' use of basic ICT** • Is aware of school and/or teacher's approach to providing a positive learning environment	• Shows an interest in teaching to promote student learning • Identifies the teacher skills needed to introduce, monitor and conclude a learning activity • Demonstrates an awareness of external factors which may influence a class and their learning • Prepares a lesson plan, in negotiation with colleague teacher, that: – addresses an identified learning outcome – demonstrates an awareness of lesson structure – demonstrates an awareness of resources etc. that are needed for the planned lesson – considers safe classroom practice	• Maintains records of observations of students' learning and teachers' teaching • Identifies intended learning outcomes of a particular lesson • Identifies opportunities for formative assessment of student work • Gives informal verbal feedback to students on their work	• Demonstrates the ability to look thoughtfully at a single teaching performance and break down individual teaching components, identify strengths and limitations • Reflects on factors that have impacted on teaching and learning activities • Begins to identify areas of improvement in own practice through self assessment
Professional experience 2	• Demonstrates care and concern for all learners • Recognises the need to maintain confidentiality • Demonstrates an awareness of responsibilities of teachers • Works cooperatively with teachers and ancillary staff • Shows familiarity with appropriate curriculum documents or guidelines • Shows familiarity with, and ability to source, appropriate content for lessons • **Creates learning materials using ICT where appropriate**	• Uses appropriate pitch, pace and projection of voice • Uses grammatically correct language and accurate written expression • Articulates a personal philosophy on creating a positive learning environment • Communicates behavioural expectations clearly and in a consistent manner • Listens and responds to student questions, comments, interests and silences	• Prepares learning experiences and uses resources at appropriate level for students • Structures teaching tasks effectively • **Identifies opportunities for achieving learning outcomes through the use of ICT** • Submits plans at an agreed time and maintains a planning file • Explores a range of questioning strategies • Explores a range of organisational strategies • Considers the need to design lesson to motivate and engage students	• Recognises opportunities for evaluation of student learning in lesson planning • Plans assessment activities to support learning • Provides students with constructive written and oral feedback on their progress in learning tasks • Begins to formally assess the impact of activities on students and their learning • Maintains appropriate records of student learning	• Identifies successes in own teaching performance • Articulates areas for improvement in own teaching activity • Seeks advice, where necessary, to identify and address areas for improvement • Shows capacity to use feedback provided to make adjustments to teaching practice • Identifies areas for further development in professional knowledge • **Identifies areas of ICT where further personal professional development is necessary**
Professional experience 3	• Participates in collegial activity and professional learning opportunities • Is aware of the guidelines for professional ethics and conduct • Demonstrates an understanding that students learn in different ways • Knows and can source appropriate content related to educational goals • Shows familiarity with typical stages of physical, social and intellectual development of students	• Communicates effectively with students, colleague teachers, support staff • Demonstrates knowledge and respect of social, cultural and/or religious background of students • Encourages positive student behaviours • Develops democratic classroom practices • Articulates a personal plan for creating a positive learning environment consistent with school policy • **Locates, evaluates and uses appropriate software packages for presenting learning materials/resources**	• Plans teaching sequences to meet stated outcomes • Plans to include a variety of teaching and learning styles • **Plans to incorporate ICT into teaching and learning** • Allows for flexibility in lesson planning • Draws on a depth of subject matter • Is well organised in terms of resources and extension material if necessary • Uses a range of questioning and organisational strategies including group and individual tasks	• Articulates the role/s of assessment in teaching • Knows and uses a range of assessment strategies to build up a holistic picture of student learning • Involves students in the assessment process by being explicit about outcomes • Maintains thorough records of students' progress consistent with school policies • **Is aware of how ICT can be used for evaluative purposes**	• Uses evaluations of student learning to plan and sequence future learning activities • Demonstrates appropriate adjustment in the teaching–learning process through reflection • Articulates the reasons for adjustments • Utilises relevant policies and documents to inform further planning and teaching
Professional experience 4	• Interacts positively with the wider school community • Shows an understanding of how curriculum framework documents are applied to teaching and learning • Shares ideas for teaching with colleagues • Contributes to resource development • Demonstrates knowledge of concepts and modes of inquiry that are appropriate to content	• Communicates effectively with all school personnel and parents (where appropriate) • Identifies and fosters students' learning strengths and interests • Assists students overcome individual learning/school difficulties • Negotiates and clarifies behavioural expectations, choices and logical consequences with students • Uses students' cultural and social backgrounds to enrich learning and responds to diverse student needs	• Uses relevant curriculum documents to assist in planning units of work • Prepares learning experiences to cater for individual differences • Uses a range of appropriate pedagogies • Selects and uses a range of resources • **Effectively uses educational technologies in teaching and learning activities** • Anticipates and plans for possible barriers to learning • Adjusts pace, direction or emphasis of lessons/units to respond to student learning	• Plans assessment which takes into account students working at different levels and having different learning styles • Clearly articulates assessment requirements and where possible negotiates these with students • Encourages student self assessment • Uses monitoring and assessment to enhance the self esteem of students • **Uses ICT appropriately to record student progress and/or assessment**	• Reflects critically on a regular basis to improve the quality of teaching and learning • Systematically collects information on student learning • Seeks advice and uses feedback in order to direct self improvement • Maintains a record of feedback and reflections to inform the on-going process of self improvement
Professional experience 4	• Contributes collaboratively to all aspects of school life • Confidently fulfils the varied roles of a teacher • Applies a professional knowledge base to the design of learning experiences • **Demonstrates ongoing Professional Learning in application of educational technologies** • Demonstrates a knowledge of appropriate professional standards frameworks with a view to an ongoing commitment to professional development • Understands and demonstrates duty of care	• Implements own behaviour management plan including responses to challenging behaviours consistent with school expectations • Explains and negotiates student goals and expectations • Acknowledges and encourages positive student behaviour in the broader school context • **Uses ICT to create, locate, modify and share information resources**	• Effectively uses strategies to determine students' prior knowledge to plan future learning experiences • Engages the students in actively developing knowledge and fosters independent and cooperative learning • Explicitly teaches skills for developing social confidence to promote positive relationships • Adapts activities/lessons/programs immediately if necessary to meet changing circumstances • Plans for individual students to achieve differentiated learning outcomes • **Plans to meet content learning outcomes through the use of a range of educational technologies**	• Uses standards documents in the assessment process • Uses a range of assessment strategies, appropriate to standards and outcomes, that allow all students to show progress • Provides for sufficient and appropriate opportunities for students to demonstrate understandings and skills • Provides parents and/or caregivers with useful written and oral feedback on student progress in learning tasks enhancing student self esteem	• Explains own developing approach to teaching and learning • Plans to meet longer term professional learning goals • Engages with current research and practitioner research to inform practice • Familiar with and capable of using Action Learning/Research principles to improve practice

Embedding ICT in Learning (EiL): Collaborative partnerships for rural schools

REPORT FROM THE NEW SOUTH WALES PROJECT

Chris Reading, University of New England
Linley Lloyd, University of New England
Sue Belford, Department of Education and Training

Executive summary

This project intended to develop a learning partnership between schools and the University of New England (UNE) to support teachers and pre-service teachers in their professional learning. A functional collaborative relationship was developed among three partners: NSW Country Areas Program (CAP) Northern Network Schools, the School of Education at UNE, and The National Centre of Science, Information and Communication Technology, and Mathematics Education for Rural and Regional Australia (SiMERR) at UNE. A Learning Community Professional Development model was trialled with teachers, pre-service teachers and lecturers linked together into eight Learning Teams that planned, implemented and evaluated in-school projects.

- The focus on embedding both Information and Communication Technology (ICT) and Learning to Learn (L2L) strategies in learning and also on combining ICT and L2L, promoted higher-order thinking with school students.
- The development of criteria and related measures to measure the value-adding capacity of the embedding of ICT in learning challenged participants' views on the assessment of students' learning.
- Basing the in-school projects in the classroom gave all participants the opportunity for professional learning in context and provided students with a wider audience.
- The Learning Community model nurtured collaborative relationships between the teachers, pre-service teachers and lecturers and provided mutual support for professional learning.
- The focus on embedding ICT and L2L strategies in learning resulted in L2L being used to enhance the use of ICT and encouraged students to engage in higher-order thinking.
- Developing value-added criteria proved to be a difficult exercise for all participants but useful measures were trialled and will provide a seed for future research.

As a result of this project, professional experience opportunities for pre-service teachers at UNE have been revised and a productive professional relationship has developed between the NSW Northern Network CAP Schools and UNE. Unintended and valuable outcomes include: the strength of the relationships that developed among all involved; the upgrading of equipment and creation of a lecturing position across the two fields of ICT and learning, and a better understanding for teachers of the process of evaluating current practice.

Purpose of the project

This project was designed to develop a learning partnership between schools and the university to support teachers and pre-service teachers in their professional learning as they embed Information and Communication Technology (ICT) and Learning to Learn (L2L) strategies in learning. The learning partnership involved a close working relationship between teachers, lecturers and pre-service teachers in the form of professional learning support in contact with isolated rural and regional schools. An important component of this partnership was the development of relationships that would support pre-service teachers to undertake professional experience in rural or regional schools. The project provided an opportunity to trial a professional learning model and to investigate the embedding of ICT and L2L strategies in learning.

The project provided a mentoring system for the pre-service teachers, who were linked to a teacher and a lecturer to form a learning team based at a particular school. All teachers and lecturers involved had indicated a specific interest in embedding ICT and L2L strategies in learning. Together these learning teams were formed into a learning community, set up to provide a communication line between the pre-service teachers and their mentoring teachers and lecturers. Each school was supported in the implementation of a short-term, teaching-based project. Online communication was used to introduce participants before activities began and to sustain communication during the project.

The partnership was a three-way functional relationship between the New South Wales Country Areas Program (NSW CAP) Northern Network Schools, the School of Education (SOE) at the University of New England (UNE), and the National Centre of Science, Information and Communication Technology, and Mathematics Education for Rural and Regional Education Australia (SiMERR) at UNE.

In addition to contributing to the research questions for the National Partnerships in ICT Learning (PICTL) Project this project addressed the following questions:

RQ1 How effective is the learning-team approach for supporting a professional development model?

RQ2 To what extent is ICT being used to develop higher-order thinking and reasoning in schools?

RQ3 What criteria can be used to measure the impact on students' learning of an environment with ICT embedded in the learning?

Context

Pre-service education at UNE

All pre-service teachers involved in the project were studying the Bachelor of Education (Primary) at UNE. This four-year program prepares pre-service teachers to become primary school teachers and was designed with ICT as one of the integrating factors. Since 2002 pre-service teachers have been encouraged to prepare an electronic professional learning portfolio to demonstrate their competence as a teacher. In the first year of this program pre-service teachers undertake a compulsory course in developing their own ICT skills, with some focus on how to use ICT in their teaching. Other pedagogy and curriculum-based courses that the pre-service teachers study include various levels of use of ICT in learning. Pre-service teachers also undertake compulsory courses introducing them to L2L strategies. The professional experience component of this program provides opportunities for pre-service teachers to teach in schools in each of the four years. These professional experiences are undertaken in a variety of schools. Each year 90% of UNE BEd (Primary) professional experience placements are in rural and regional schools. Extra-curricular opportunities, including *Beyond the Line and Beyond the Bridge*, allow pre-service teachers to experience rural and regional education.

Country Areas Program (CAP) schools

Criteria for schools to be designated as eligible for the CAP program are based on population, distance from major population centres and school density. All teachers involved in the project were teaching at CAP schools in the Northern Network. During 2004–05 these teachers were involved in two major projects around ICT and L2L in learning: gaining professional experience by attending a practicum at Apollo Parkways Primary School or Glen Waverley Secondary College, and developing Digital Portfolios. Both these programs focused on the integration of ICT into an effective teaching and learning environment. The first project involved many CAP teachers travelling to Victoria to experience the three-day practicum at one of two 'lighthouse' schools, and then returning to their own school to develop and implement, with support, a project to develop a thinking culture in the classroom. The second project involved relevant training for teachers and then students to produce digital portfolios. Present evaluation processes for these activities do not include accurate qualitative measures of the effect of such programs on the staff and students involved.

Embedding ICT in learning

Research indicates that ICT has the potential to support improvements in aspects of literacy, numeracy and science and that ICT plays an important role in motivating students, raising students' self-esteem and confidence, and enhancing student interaction, verbalisation and involvement in collaborative learning (BECTA, 2002). To justify the re-direction of money into sustainable funding for ICT infrastructure and training, senior managers in schools need to be able to show that real gains in learning are coming from the investment (Broadie, 2003). How can a school measure the impact of ICT on students' learning? The European Education Partnership (Broadie, 2003) published a list of eleven value-added areas:

- extending learning time;
- increasing communication;
- improving access to resources;
- increasing motivation;
- re-balancing teacher-mediation and autonomous learning;
- introducing scale-ability and consistent applicability;
- access for minorities;
- more information channels;
- brain centred learning;
- publishing and audience;
- management and recording.

This list has been compiled from a synthesis of common factors by expert members involved in ICT-for-learning. However, the developers are the first to admit that there has been no link made to proven and researched learning gains. They do however, point out that the list has been widely commented on. Thus far no additions have been suggested or deletions recommended. How does what teachers observe in their schools compare with this list?

Learning to learn strategies

Traditional models of teaching emphasised the passing-on of knowledge from teacher to learner (transmission model of teaching). Current ideas about effective learning emphasise the role of the learner. For learning to be effective, learners need to be actively involved in building up their own understandings, rather than accepting and reproducing the teacher's understandings. This student-centred active approach is a constructivist approach where students are engaged in self-direction, metacognition, and assessment.

'Self-direction' involves goal-setting, negotiated curriculum, independent research, and multiple ways of both learning and demonstrating this learning (e.g., visually, 3-dimensionally, role play). 'Metacognition' involves students' thinking about their learning and focusing on the process of learning rather than simply the product. Questions and reflection stems used by metacognitive students include: 'How can I solve this problem?', 'Was my strategy the most efficient strategy to use?', 'Would other strategies have been successful?', 'I am proud of …', 'Today I discovered …'. Reflecting on their learning is an aspect of metacognition which is a major thrust of 'learning to learn' programs. 'Assessment' in the context of 'learning to learn' involves both self-assessment and peer assessment.

Professional development models

A major Literature Review (DEST, 2002) has been undertaken that provides an important base for consideration of professional learning based around the integration of ICT. Specific recommendations were made for the development of a support mechanism in the second phase (DEST, 2002, p. 82). Particularly important is the need to foster interaction between the four major stakeholders: those responsible for systemic professional development programs; school leaders and in-school ICT coaches; leaders of professional associations; and teacher educators. A number of professional learning models were reported on but the one most relevant to this project is the Professional Learning Community Model (DEST, 2002, p. 44). An important issue (DEST, 2002, p. 57) to consider with professional development has been the need for more collaboration between the various systems with respect to the design and delivery of professional development. The model in this project expanded on the concept of a learning community by involving a pre-service teacher, a tertiary lecturer and an in-service teacher in a rural and remote school/classroom, with a clearly identified purpose and the power of the collaborative nature of the project to focus on improved student outcomes.

Partnership

A functional partnership was formed between the NSW Country Areas Program (CAP), the School of Education and the SiMERR National Centre. This partnership hoped to improve rural education and provide quality teachers to rural schools.

NSW CAP is a unique program providing support for students who are attending primary and secondary schools in geographically isolated areas, or are in distance education facilities servicing these areas. The CAP Northern Network comprises 65 schools across the northern section of NSW ranging in size from 540 students K–12 to five students in a K–6 school. During 2004 and 2005 staff at the majority of these schools were involved in major projects focused on the integration of ICT into effective teaching and learning environments. The specific CAP schools selected were those whose staff had experienced innovative practice by attending the Apollo Parkways Practicum and had embarked on a mission to embed ICT and L2L in learning at their schools.

The School of Education (SOE) at UNE has 56 academic staff, associated postgraduates and administrative assistants and provides both pre-service and in-service teacher education. It is committed to being a national and international leader in education with a priority of serving regional Australia. A major goal is to support collaborative research into the innovative use of technology in teaching and learning. UNE provides a high proportion of teachers to rural and regional schools.

SiMERR was established in July 2004 to support rural and regional communities in Science, ICT and Mathematics teaching and learning. The centre offers a national focus for pre-service and in-service professional learning of primary, secondary and tertiary teachers and undertakes strategic research into enhancing student learning outcomes in rural and regional Australia in order to inform curriculum development and professional teacher learning. Current projects include three large ARC grants on assessment practices, academic skills for low achievers, and developmental-based assessment. The university provided the management processes for the project, including the analysis and reporting of results.

The project management team comprised one representative from each of the three partners NSW CAP, SOE and SiMERR, and met regularly throughout the life of the project. The management team was advised by an on-site evaluator, and a steering committee that included representatives from the SOE, CAP, Department of Education and Catholic Education Office.

Project design

The EiL professional learning model consisted of learning teams combined to form a learning community. Each learning team contained a lecturer, teacher and pre-service teacher in a collaborative partnership to plan and implement a short project in the school. The collaboration included: a face-to-face sharing and planning workshop, joint implementation of a short project, online collaboration, a school visit, and a final sharing workshop. For detailed reports on each of the eight school projects see Reading, Lloyd and Belford (2006b). The three-way partnership aimed to change the nature of the pre-service teacher experience by providing an opportunity for professional conversation between pre-service and in-service educators, and an opportunity for students in rural schools to take their ideas to a wider audience, especially the pre-service teacher.

Implementation of the model focused on embedding ICT and L2L in teaching practice. This focus of the collaboration provided an opportunity for promoting the 'communication' aspect of ICT within the learning environment. The structure of the model allowed the pre-service teachers to see and to experience such teaching practice and to be an integral part of the process of developing criteria to measure the effectiveness of such programs. The management team provided a number of opportunities for professional dialogue.

Key activities in the project were:

2005	
May	• selection of participants
	• planning of activities
	• ethics and intellectual property submissions
	• design of online communication environment (WebCT)
June	• lecturers attended Apollo Parkways
	• participants linked to online communication environment
July	• Initial Professional Sharing Day for all participants allowed CAP teachers to share their 'journey' and learning teams to plan a short-term in-school teaching and learning project
August–September	• implementation of the in-school projects
	• lecturers (as researchers) and pre-service teachers travelled to the eight CAP schools to collect research data
October	• Final Professional Sharing Day–learning teams presented to celebrate success
November–April	• analysis of data
	• report writing
2006	
March	• two ACEC2006 conference papers submitted for review to share findings with a wider audience
April	• project paper presented at PICTL forum.

All eight schools involved in the project were part of the CAP program and contact with the schools was well supported by the Northern Network CAP consultant. Seven government schools and one Catholic school were selected by negotiation with the relevant teachers and principals. These schools ranged from a one-teacher primary to a K–12 central and were located in the northwest of New South Wales.

The eight CAP schools provided the nine teachers for the project. Although the plan only involved one teacher from each school, one school ultimately had two teachers involved. This occurred because the teacher originally selected could not fulfil an initial commitment and a colleague attended. This meant that both teachers then wanted to be involved and so the two teachers shared the participation. The nine teachers involved, three male and six female, ranged from second-year-out to a very experienced principal.

The eight pre-service teachers and eight lecturers involved were all from the School of Education at UNE. The pre-service teachers, seven female and one male, were drawn from the second-year cohort of the Bachelor of Education (Primary) program. They were selected by application. The lecturers selected, six female and two male, were all involved with the BEd (Primary) program. The selection was based on a process of negotiation after a diverse range of lecturers had been initially identified. The lecturers involved included the Program Director, the Director of Professional Experience, three lecturers in ICT education and three lecturers in learning and teaching.

Data collection and analysis

A range of qualitative data was collected to provide a rich source of evidence to address the research questions.

Data collection events are described below.

- *Initial Questionnaire* completed by each lecturer, teacher and pre-service teacher before the project began.
- *Apollo Parkways Practicum Implications Report* completed by the lecturers at the conclusion of the practicum.
- *Apollo Parkways Practicum Evaluation Form* completed by the lecturers at the conclusion of the practicum.
- *Initial Professional Sharing Day: Participant Evaluation* completed by each lecturer, teacher and pre-service teacher.
- *School Visit Field Notes Form* completed by each lecturer and pre-service teacher.
- *In-school Project Report Form* completed by each learning team.
- *Final Professional Sharing Day: Participant Evaluation* completed by each lecturer, teacher and pre-service teacher.
- *Final Questionnaire* completed by each lecturer, teacher and pre-service teacher after the project had finished.
- *Lecturer Focus Group*: an informal meeting was held to discuss future directions.
- *Management Reflections* were based on de Bono's Thinking Hats.

Participants provided a rich array of data by completing these various documents but were not responsible for analysis of the data. The management team worked with the qualitative data by meeting regularly, both face-to-face and electronically. As most responses were open-ended the analysis involved a process of collapsing the raw responses into manageable categories by collecting like-items. The process of collapsing into categories for the two 'final' documents, the sharing day and questionnaire, was simplified by using the categories from the relevant 'initial' documents and then adding/deleting categories where necessary.

The ranking by level of reflection for the Apollo Parkways Practicum comments was decided using a modified version of the *Nominal Group Technique*. This strategy is a collaborative process to make decisions/prioritise important issues that allows individuals to come to a consensus by voting on the issues in priority order. The data list is created individually and then as a whole group. Next each member assigns a number to each item in order of 'importance'. In this case it was 3 (high order, complex, reflective), 2 (middle order, less complex, surface level reflective) or 1 (low order, simple, observational). The rankings are based around a common language and contextual understanding of the indicators for each response. The rankings for each item are then averaged to determine the ultimate position of the item.

The results of the analysis are presented in the next section. These results were used to inform the responses to the research questions in the subsequent discussion section.

Results

The results of the data analysis are organised around the data collection based on six key project activities: Apollo Parkways Practicum, Professional Sharing Days, School Project Implementation, Questionnaires, Lecturer Focus Group and Management Reflections. Information and Communication Technology and Learning to Learn have been abbreviated to ICT and L2L respectively. For more detailed discussion of the results see the expanded version of this report (Reading, Lloyd & Belford, 2006a).

Apollo Parkways Practicum

The eight lecturers who attended the practicum reflected on the experience using de Bono's Thinking Hats. The lecturers appreciated the opportunity to visit classrooms and to see the various technologies and learning strategies in use. More importantly, they were impressed by the students' involvement in, and ability to reflect on, their own learning. This stimulated the lecturers to reflect on their own practice, especially the implications of the thinking curriculum approach to classroom operational practice.

The lecturers also reflected on the implications of the practicum experience. They identified that the linking of the various factors (such as embedding ICT, L2L strategies, active student involvement in their learning, professional development) within an overall school-wide framework is important for learning. They also noted that this linking is both achievable as observed at Apollo Parkways, and valuable in terms of the effect on learning. The practicum experience provided an opportunity for confirmation of their own beliefs and the realisation of the need to re-examine their own practice. Reflections demonstrated an openness to explore new ideas and focus on 'big picture' ideas without commenting on the day-to-day practicalities of teaching.

Professional Sharing Days

Initial Professional Sharing Day

The most common discoveries amongst all participants related to the value of seeing examples of effective teacher practice, both generally and specifically in relation to ICT and L2L. Links between teacher practice and student learning were specified by university-based participants, but not by the teachers. Pre-service teachers recognised the benefit of teachers planning their practice for student learning. At this stage, teachers were focused on learning about each other's practices but they did not formally mention the link between these practices and student learning. The benefits of working collaboratively were recognised by teachers and lecturers but not by pre-service teachers.

Sources of enthusiasm for university-based participants arose from the potential to have contact with schools in terms of visits to see classroom practices, and also to adapt practices for their own teaching and to be part of classroom practice via the learning team. The pre-service teachers' enthusiasm to visit the schools stood out. Both university and non-university based participants were enthusiastic about implementing the project. Teachers were particularly enthusiastic about working as part of a team.

The most desired needs for future learning for teachers were focused on their own ICT skills and classroom practice, especially learning from others. University-based participants wanted to know more about L2L and the use of ICT for learning.

Challenges varied across the groups. The teachers and pre-service teachers found dealing with the enthusiasm and contribution to the project difficult. Generally, participants found the detailed project planning to be the most challenging part of the day, particularly the pre-service teachers whose understanding of classroom practices in relation to ICT was not as strong. Lecturers identified their own lack of expertise in ICT and L2L as a hindering factor in planning the project. Many participants were concerned about the practicalities of the project itself rather than the potential outcomes.

Among all participant groups, as much interest was expressed in the teachers' presentations session as in the planning session. The pre-service teachers and lecturers found interest in both sessions, while teachers found the project planning more interesting.

Of the two sessions offered, presentations and planning, all participants chose planning as "what didn't work so well for them". The main reason identified was the lack of time. Teams expressed the need for more time to form a collaborative relationship, to clarify the goals for the session, and to consider the planning process. The collaboration process itself was a concern for one of the teams, irrespective of the lack of time.

Final Professional Sharing Day

Many reflections on the Final Professional Sharing Day evaluation, provided at the conclusion of the day, related to the 'whole' project rather than just the sharing day. This suggests that the day was seen as an integral part of the project. This day was only the second opportunity for the learning community to operate together face-to-face and the first opportunity for the learning teams to function together for an audience. Most discoveries were about embedding ICT and L2L in learning. Presentations stimulated thinking about learning and there was strong appreciation of the expertise and contribution of all concerned, and the support provided.

Teachers, both pre- and in-service, were most enthusiastic about ways to implement new ideas into their own practice. Lecturers were most enthusiastic about seeing what was happening in schools, not about where this would lead in their own practice. There was enthusiasm to set new personal teaching-related challenges. For all groups of participants the recognition of a need to learn more about ICT was strong. Learning more about L2L was also important for the university-based participants. Pre-service and in-service teacher challenges focused on implementation issues. All participant groups were challenged by the nature of the collaborative relationship in the learning team. One lecturer expressed a more general concern about the failure to prepare pre-service teachers well enough for the future.

Overwhelming interest was expressed in the learning team presentations to the learning community, as opposed to the report writing session that followed. Two presentations were singled out for special mention, iMovie with Stage 1 students and Inspiration with spelling activities. The reasons given for the interest in iMovies were the high level of ICT skills of Stage 1 students, the linking of ICT with all KLAs, and the use of ICT to supplement the information report produced by the students. No particular reasons were given for the interest in Inspiration. Consideration of what didn't work on the day revealed that of most concern was the lack of time for discussion in both the sharing and report writing sessions. Eleven of the responses were not considered because they related to the project in general

rather than the sharing day. In these, teachers mostly focused on operational issues which included the great distances hampering contact, functional problems with WebCT as a communication tool, and the short timeframe for the project.

Comparison of the two Professional Sharing Days

For both days the discoveries focused on what could be learnt relating to the effectiveness of embedding ICT (in particular) and L2L strategies in learning/teaching. Initially everyone was focused on the present in implementing the project and enthused about their own learning, but finally everyone was excited about the potential for rethinking their own practice. This focus on rethinking practice was reflected in their responses about desired future learning, where the references to ICT and L2L were far more specific in the final sharing day evaluations.

All participants found the collaborative aspect of the planning challenging, but for different reasons. As the project progressed the challenge shifted towards implementation issues such as time and resources. On both days participants enjoyed learning about new areas but at the end interest shifted to a more collaborative approach of sharing their learning journeys and seeing the success of the school projects. All participants identified time for discussion and planning as the key inhibitor on both days.

As the facilitator circulated on the initial sharing day, she observed that teachers found it confronting to share their control of planning for the classroom. Lecturers and pre-service teachers found it difficult to find a role in a process that was already in place in the classroom. Pre-service teachers also found it difficult and challenging to work as a collaborative partner with 'senior' educators. Observations on the final day indicated a growth in professional learning and an enthusiasm for embedding ICT and L2L strategies into their own practice. The level of professional dialogue was of an extremely high quality.

School Project implementation

School Project Reports

The school project reports, for more detail see Reading, Lloyd and Belford (2006b), provided an interesting insight into the focus of the projects and the frustrations of implementation. For a further discussion of one of the school projects, which focused on promoting thinking in a rural classroom, see Cornish, Kite and Cecil (2006). Following is some key information from those reports including: ICT used, L2L used, valued-added criteria developed, changes from initial plans, communication processes, skills learnt and what the future holds.

ICT used

Each learning team was free to choose ICT relevant to the context of the project. Most hardware choices stayed with basic hardware, except for the student use of digital cameras and digital video cameras to capture images for movies, animations and portfolios; data projectors to share learning; and MP3 technologies to attach sound to animations. One interesting use of hardware was the recording of student interaction using a video camera. There was a wide variety of software choices used with the students at various stages of the project cycle: planning, producing, publishing and evaluating.

L2L used

L2L strategies were used by all teams to promote higher-order thinking, independent learning and, specifically, metacognition. The various strategies were used as scaffolds to structure both reflective thinking and self-assessment as well as for planning.

Criteria for value-adding

Learning teams found it difficult to clarify the 'value-added to learning' criteria to be used and/or to develop a suitable measure for the criteria. Some teams focused only on technology skills as indicators of learning, while other teams included broader skills and behaviours. The behaviours included student confidence, reaction to constructive criticism, autonomous learning and the ability to work cooperatively. Student self-assessment using a capacity matrix was a common measure of learning. For more detailed discussion of the exploration of value-added criteria see Reading, Cornish and Belford (2006).

Changes from initial plan

Some schools were able to implement their project as planned while others made minor changes, such as change of strategy, rather than major changes, to the initial project design. The changes were driven by factors both within and outside the control of the project. Changes from the initial plans, within the control of the project, included: not using specifically planned ICT or L2L; less linking of KLAs than desired; simplification of student and learning team member roles. Changes from the initial plans, not within the control of the project, included: different software used owing to cancellation of professional learning; improvised resources owing to non-delivery in isolated areas; reduced complexity of technological activity owing to equipment failure and lack of technical assistance; reduced interaction between students and pre-service teacher owing to professional experience commitments in other schools.

Apart from the changes to planned activities, there were some aspects of the projects that were not completed. These included specific project activities, such as a visit of guest speaker, and student self-assessment. Most schools reported a continual process of adjustment to the project schedule due to commitments extraneous to the project.

Learning team communication

Communication between the members worked well for all learning teams. All teams made use of the telephone, with some also making use of e-mail and fax. All teams used the WebCT online environment to download documents containing project information. Four of the eight teams made use of the online learning community environment to facilitate communication between learning team members.

Communication worked well when it was synchronous but was a problem when it was not, mainly because there were not e-mail alerts to tell participants when to access WebCT for new information. Teachers do not use e-mails as much as lecturers and pre-service teachers and this was a problem. Despite the use of WebCT being seen as a good idea by participants, the asynchronous nature of WebCT prevented more frequent use, as finding time to access WebCT lessened more regular communication.

Most communication between students and pre-service teachers occurred during the face-to-face site visits to schools. Each learning team undertook the one face-to-face site visit scheduled by the project and one learning team arranged an extra site visit. Only one project managed to arrange communication between the students and pre-service teachers using the e-mail within WebCT.

What was learnt by the participants?

All participants acknowledged personal learning in ICT and L2L strategies and their use, and enhanced collaboration, communication and organisational skills in new environments. Participants also recognised the value for enhanced learning when ICT and L2L strategies are used, both individually and in combination, and developed a better understanding of student capabilities.

What next? The future

Participants want closer links to be established on an ongoing basis between CAP schools and pre-service education within the university, and the opportunity to participate in similar projects in the future. Suggestions related to both similar projects and the participants themselves. If the project was to be repeated then suggested changes included: pre-service teachers should complete an in-school professional experience period during the project, more professional learning, improved collaboration, clearer definition of roles in the project, time to rethink own practice, and increased use of peer tutoring by teachers.

Field notes

Teacher enthusiasm, teacher's relationship with students, and teacher confidence with ICT were rated highly by both lecturers and pre-service teachers, as were (not quite so highly) classroom climate and student enthusiasm. There was strong agreement that the use of ICT in the classroom was not seen as threatening but rather for independent use as part of normal classroom practice. Competent and confident use of ICT was observed, with ICT being seen as non-threatening. Also obvious were low levels of frustration with use of ICT, and relatively high independence. A good range of software/skills was being used in the classrooms. Comments about the L2L related to active learning told a different story from the quantitative results. Self-monitoring discrepancy between lecturers and pre-service teachers could be explained by lack of understanding of the term, especially by pre-service teachers. The active-learning discrepancy in the quantitative results was not supported by the written comments. Cooperative-learning discrepancy was elaborated in the written comments with observations that students worked together but not always cooperatively. Group work tended to be sharing of resources rather than true collaboration with joint learning and allocated roles. A question raised was the role played by ICT in *enabling* all these inter-related factors (enthusiasm, positive relationship, confidence, classroom climate). Does embedding ICT lead to changes in the way learning activities are structured, and hence in climate, relationships, enthusiasm?

Questionnaires

Initial Questionnaire

Expected personal outcomes from Project

The expectations of project outcomes were investigated from a personal perspective and from the perceived perspective of other participants. The greatest expectation, from all participants but especially from pre-service teachers and lecturers, was for better understanding of how to support the embedding of ICT in learning and the use of collaborative relationships for professional improvement. Teachers were more likely to express a greater range of personal expected outcomes. Lecturers and pre-service teachers perceived expectations of outcomes did not always match the expressed personal outcomes. For example, pre-service teachers and lecturers expected that a teacher outcome would be professional learning in context but this was not mentioned by the teachers. Apart from this focus, the others' expectations for teachers were very similar to their expectations for themselves. Lecturers and teachers expected the pre-service teacher gains to include professional learning in context, collaborative relationships for professional improvement and awareness of rural and remote issues, but the pre-service teachers barely mentioned these. However, there was agreement between lecturers, teachers and pre-service teachers that embedding ICT would be an important outcome for the pre-service teachers. Pre-service teachers and teachers identified professional learning in context and the expectation of changes in pre-service education as important outcomes for lecturers, but neither of these was identified by the lecturers themselves as personal outcomes. There was agreement between all groups of participants that lecturers' gains would include collaborative relationships and enhanced understanding of the embedding of ICT in learning. The pre-service teachers expected lecturers to gain from the collaborative relationships but did not expect such an outcome for themselves.

Embedding ICT in learning

Core beliefs about embedding ICT in learning showed that lecturers and teachers strongly believed in the use of ICT as a learning tool integrated across the curriculum. However, pre-service teachers were more likely to view ICT as useful for preparing the students for the real world. Perhaps the pre-service teachers were more conscious of the need for ICT as a learning tool in the real world. All participants, except for three pre-service teachers indicated that they already made use of ICT in their current teaching practice, but the type of usage varied among participants. Most participants used ICT for productivity in a variety of ways. There was some use of ICT as a learning tool but mostly by teachers and lecturers. Not many pre-service teachers saw the potential of ICT for learning but they had only undertaken one professional experience in schools before the project. Teachers were more specific than lecturers about the nature of the use of ICT as a learning tool. When the university-based participants were asked about teacher use of ICT they identified the productivity and learning tools aspects, as previously stated by teachers but they also believed there would be student use as a productivity tool, not specified by teachers previously. When teachers were asked about lecturer use of ICT, teachers only believed lecturers were using ICT for their own productivity and not for student learning.

Various advantages of embedding ICT were indicated, most importantly the increase in student engagement noted by both teachers and lecturers. They also saw the enhancement of learning as important. Pre-service teachers were not able to provide many advantages beyond acquiring ICT skills. Pre-service teachers did not see preparation for the 'real world' as an advantage even though this dominated their core beliefs about embedding ICT. The disadvantages expressed by all three groups of participants were more about the practical aspects of embedding, such as poor infrastructure and lack of skills training, rather than the actual relationship between ICT and learning.

Embedding L2L strategies in learning

Core beliefs about embedding L2L strategies in learning showed that all groups of participants believed that it allows students to become independent learners and be more aware of their own learning (metacognition). These are not unrelated concepts and the pre-service teachers focused more on the metacognition, while lecturers focused more on the independent learners. Only lecturers mentioned them as useful for the real world. Teachers and pre-service teachers believed engagement and diversity were important. All expressed beliefs about empowering students. Although all teachers and most pre-service teachers already made use of L2L strategies in their teaching practice, only half of the lecturers did. Lecturers and pre-service teachers did not describe many specific uses of L2L strategies but teachers provided many. Pre-service teachers and lecturers made use of the strategies for their own productivity but not to scaffold the students' work. Pre-service teacher and lecturer beliefs of the teacher use of L2L strategies as a learning tool and to foster independent learning, focusing on functionality and empowerment, were consistent with how teachers described their own practice. Teacher beliefs of lecturer use of L2L strategies indicated that they did not really know, as few responded.

All groups of participants identified advantages of using L2L strategies, especially the focus on student learning, but teachers provided the greatest range of advantages. Teachers were able to recognise the many ways these strategies can facilitate learning but lecturers and pre-service teachers were not so aware of the diversity of advantages. Teachers and pre-service teachers focused on enhancing learning and increasing student engagement. The main disadvantages in making use of L2L strategies were about implementation, such as the time needed to learn them and adverse reactions to their use, rather than the strategies themselves.

Final Questionnaire

Personal outcomes from Project

The expectations of outcomes were investigated from a personal perspective and from the perspective of other participants. Teacher outcomes were more focused on student learning, with some giving recognition to the collaborative relationship. On the other hand, pre-service teachers and lecturers believed that the most common outcome for teachers was development of collaborative relationships in the learning team and having this team for professional support. Lecturers also perceived affirmation of practice as important for teachers. Pre-service teachers believed their main personal gain was from the development of collaborative relationships, but they also benefited from the opportunity to learn more about L2L and how to embed ICT and L2L. Teacher and lecturer perceptions of the pre-service teacher gains were similar, except that they also believed there was more exposure to best practice and ideas for their own practice, and awareness of rural and remote schools and their issues. Lecturers noted a better understanding of how to embed ICT in learning and of student capabilities, as well as the development of collaborative relationships. Teachers and pre-service teachers perceived a wide range of outcomes for lecturers. This may have been because the lecturers had different backgrounds in terms of the knowledge and experience they brought to the project. Each group identified professional learning in context as important for others but not for themselves.

Embedding ICT in learning

A majority of participants identified their core beliefs in relation to the embedding of ICT in learning as the value of ICT as a learning tool and as preparation for the 'real world'. University-based participants believed ICT increases student engagement. Teachers and lecturers believed ICT allows students to become independent learners. Almost all participants agreed that they will make use of ICT in their teaching practice. When asked to explain how they will do this, all participant groups (teachers, pre-service teachers, lecturers) wrote that they would use ICT as a tool for learning and integrating curriculum. Teachers and lecturers also proposed to use ICT to support students to become independent learners. Only pre-service teachers mentioned that they would use ICT for engagement. Lecturers and pre-service teachers believed that teachers most commonly use ICT as a learning tool and as a production tool. Teachers believed that lecturers use ICT for reasons not directly related to learning, i.e., for productivity and communication.

The main advantage identified for embedding ICT in teaching practice is that it increases student engagement, but use as a learning tool (including development of independent learners) and as a preparation for the real world were also mentioned. Uses of ICT less directly related to learning, e.g., improving teacher productivity, increasing access to resources, were also seen as advantages. Disadvantages of embedding ICT in teaching practice related most commonly to infrastructure and resource issues. Lack of facility with ICT and time needed to use ICT were also identified. Lecturers and pre-service teachers saw lack of professional support as a disadvantage, while teachers and pre-service teachers identified lack of student experience with ICT as a disadvantage.

Embedding L2L strategies in learning

Core beliefs about embedding L2L strategies in learning showed that all participants believed that L2L strategies encourage independent learning and self-monitoring of learning. Teachers and lecturers believed that L2L strategies cater for student diversity. All participants except one lecturer (not currently responsible for teaching) indicated that they would use L2L strategies in their current teaching practice. When describing how they will use L2L strategies, participants most commonly indicated use as a support for students to become independent learners and as a framework to structure learning activities. Pre-service teachers and lecturers believed teachers primarily use L2L strategies as learning tools. Most teachers did not express any belief about lecturer use of L2L strategies.

Encouraging independent learning, enhancing learning, and catering for diversity were identified by all participant groups as advantages of using L2L strategies. Teachers and pre-service teachers also believed that L2L strategies provided preparation for the real world. The disadvantages of using L2L strategies did not relate to their use for learning but rather to the time required to learn and use them, and potential lack of student engagement with the strategies.

Learning team professional development model

Participants primarily identified experiences related to working in a collaborative team, and gaining professional development in context, as valuable outcomes of the professional development model used. By far the most common change to the professional development model suggested by participants was to have more time for planning, communication and implementation of the project. Pre-service teachers simply identified time, while teachers and lecturers were specific about how the extra time would be used. Better clarification of roles in the learning team was also identified, by all participant groups, as a necessary change. Opinions were divided about the usefulness of the online Learning Community discussion. All but one teacher, and half the lecturers, did not find the online forum useful. Pre-service teachers identified the value of learning community discussion as a source of information and as a means of communication. While some participants from each group found the online environment useful in their learning team for organising and discussing the project, most participants did not find it useful. All learning teams used a variety of communication strategies, including telephone, non-WebCT e-mail, fax and WebCT e-mail. Despite the asynchronous nature of e-mail and WebCT, most saw it as the most useful of the communication strategies. Some, however, believed that the telephone, fax and non-WebCT e-mail were more useful. One learning team commented that videoconference access would have been useful to allow low-cost additional synchronous meetings.

Evaluation of the classroom component

Participants were asked to describe how the school visit was useful. Lecturers and pre-service teachers valued the opportunity to see the project in action while teachers valued the 'extra hands' and the resulting increase in student enthusiasm. Lecturers particularly valued the opportunity to visit a rural and remote classroom. If the project was to be repeated, participants (especially the pre-service teachers) believed that the inclusion of a professional experience component would be the preferred model for school visits. All participant groups wanted to incorporate more visits if the project was repeated. In particular, face-to-face planning time at school was identified as a useful improvement. Teachers and university-based participants identified different effects of the in-school project on their understanding of classroom practice. Pre-service teachers and lecturers identified as the greatest impact, an enhanced understanding of embedding ICT and its potential for learning. Teachers did not mention any changed understanding of classroom practice. The only professional impact identified by all participant groups was enhanced understanding of embedding ICT and L2L strategies. Lecturers and pre-service teachers identified enhanced understanding of rural and remote schools, and teachers and pre-service teachers identified learning to function as part of a professional team. Teachers and lecturers reconsidered their own practice as a result of the project.

Evaluation of professional learning

All participant groups found something about the learning opportunity challenging. Working within a learning team was challenging for all participant groups but especially for teachers. Teachers and lecturers found juggling the project with other commitments difficult. All participant groups, especially lecturers, benefited from the professional learning opportunity. All groups benefited from developing professional relationships and rethinking their practice. Lecturers and pre-service teachers, but particularly lecturers, also identified as beneficial seeing classroom practice in embedding ICT and L2L strategies, and personal learning about ICT and L2L strategies. The only challenge in terms of professional growth identified by more than two participants was that of communication and

interaction, which was particularly challenging for pre-service teachers. Several professional growth benefits were described by participants. Working in a team and developing professional relationships were identified by all participant groups. Lecturers also strongly identified enhanced understanding of ICT and L2L strategies.

Comparison of Initial and Final Questionnaires

In both the expected personal outcomes (initial) and the observed personal outcomes (final), the focus of personal observations was different from what groups perceived they would be. However, comparing what each group expected as personal outcomes with what they believed resulted from the project, shows that teachers achieved the wide range of benefits that they expected but pre-service teachers and lecturers described a much greater range of resulting outcomes than what they had expected. Pre-service teachers mostly expected to get a better understanding of how to embed ICT in learning — this had been presented to them as a focus for the project — but at the completion of the project reported a greater range of outcomes, especially in relation to learning about L2L, how to embed L2L in learning, and collaborative relationships for professional improvement. Lecturers also gained a greater range of outcomes than they expected, especially their awareness of best practice and issues concerning rural and remote schools.

Core beliefs about embedding ICT in learning changed during the project. Although the importance of integration of ICT was a constant belief, there was far more core belief expressed about students' engagement after the project was completed. This reflected an increased focus on students in the post-project core beliefs. By the end of the project all participants said they would use ICT in their teaching except for one lecturer. Perhaps this lecturer said 'no' due to a change in idea about what it meant to 'use'. There was a change in emphasis in the ways that ICT would be used in teaching from productivity to a focus as a learning tool for students. In particular, at the conclusion of the project, teachers were more specific about how the students used ICT, and lecturers specified more ways they could use ICT, including communication and sharing knowledge. Although a greater range of advantages with less emphasis on acquisition of core skills was given after the project, disadvantages identified were similar.

When expressing their core beliefs about using L2L strategies in learning, participants' language broadened after the project, with final recognition by all groups that it could cater for diversity. Initially this had only been recognised by teachers. There was a large increase in the number of participants who said they would use L2L following the project, with just one lecturer still not planning use. Expressions of how the L2L strategies would be used changed as a result of the project. Initially teachers used many expressions that suggested independent learners but after the project were more specific about using the actual term 'independent learner'. In particular, teachers talked about using L2L to scaffold assessment. No university participants used the expression 'independent learner' prior to the project but many used it afterwards. Also, there was no mention of teacher productivity as there had been prior to the project. The focus of comments made had shifted to the learners. Lecturers still found it difficult to express how they would use L2L strategies. Identified advantages and disadvantages of using L2L were generally unchanged by the project although lecturers had begun to recognise that L2L strategies could enhance learning.

Lecturer Focus Group

After the main activities were completed the eight lecturers met as a focus group to suggest revisions that should be considered for any future project:

- use schools that are more accessible, making face-to-face contact more time and cost effective;
- include the professional experience component for the pre-service teachers, thus allowing more contact between pre-service teachers and school students;
- change the learning team to include one lecturer with two teachers and two pre-service teachers at one school, to optimise the visits;

- introduce recognition for pre-service teacher such as in the UNE New England Award;
- change the Initial Professional Sharing Day to include a bigger audience (e.g., teachers not involved in the project) and to have two days allowing more time for planning;
- take new lecturers introduced to the program to visit local CAP schools to see implementation rather than having to travel the long distance to Apollo Parkways;
- locate the experience in the Third Year for the pre-service teachers, building it into the professional experience and linking it with assignments.

Management reflections

The three project managers reflected on the management process and project outcomes. The main improvements to process suggested were strengthening the project academic focus and making some changes to operational details. All team members shared the view that the management process had worked well at the management team level and had provided opportunities for stimulating collaboration. Difficulties encountered focused on the planning details for implementation within the learning community. Management believed that the project provided a new opportunity to support pre-service teachers. The feeling of collegiality that developed allowed a degree of reflection on their teaching and learning that contributed to their practice. Improvements suggested focused on the university's role in the partnership, ranging from selection of appropriate pre-service teachers to improvements in facilities and the professional learning of academic staff.

Discussion and implications

Effectiveness of learning team approach

While the participants embraced the learning team approach, most identified working as part of a learning team as a professional learning challenge. The effectiveness of the model is reflected in the professional learning benefits described by the participants, including:

- provision of collegial support in a collaborative situation;
- development of collaborative skills;
- opportunity for professional development in context;
- broadening of professional horizons and networks.

More than half the participants noted, as a personal outcome, the development of a collaborative relationship for professional development. The challenges experienced led to suggested improvements for future implementation:

- formation of larger learning teams, such as school-based with more than one teacher and pre-service teacher linked with each lecturer;
- facilitation of professional conversation at an academic level;
- clarification of learning team roles for maximum involvement.

The learning team approach included interaction of the learning teams at a learning community level. This was a less successful aspect of the model. Although some interaction took place during the professional sharing days, there was very little interaction in the online environment that had been established for community support. This might have been due to the energies being invested at the learning team level in terms of short timeframes and expected outcomes, but also might have been due to the lack of structure provided by the management team at the community level. Most contributions were for information only and did not facilitate academic discussion. As well, an implementation problem existed because some teachers found accessing the online environment difficult for technical reasons. Others did not like the asynchronous nature of the communication and concentrated instead on familiar and reliable means such as telephone and fax for their within-team communication. These participants did not perceive a need to log on to the online forum for within-

team communication and so could not avail themselves of the opportunity for between-team (community) interaction. These issues have been addressed in a subsequent CAP project in 2006, using a combination of video conferencing, face to face meetings, exchange of resources and the *Bridgit* software to work in a more productive professional learning community environment.

Extent of ICT use to develop higher-order thinking

The in-school projects undertaken included the use of a wide range of software, producing presentations, animations and movies. There was also a strong use of software, in particular *Inspiration*, during the planning of these productions. More importantly, the use of this software was strongly supported by the use of L2L strategies. These strategies assisted the students to take more responsibility for their own learning by self-assessing their ICT abilities and reflecting on their ICT use, i.e., by engaging in evaluative and metacognitive thinking. The use of ICT to foster cooperative, yet independent, learning meant that ICT became an integral part of the students' creation of their own knowledge.

An important element of the extent of the use of ICT to develop higher-order thinking was the alignment of participants' beliefs with practice, i.e., the alignment of beliefs about the importance of embedding ICT in learning with the actual practice of such. Prior to the project most of the teachers and lecturers held the core belief that ICT should be used as a learning tool for students, with pre-service teachers holding the more general belief that ICT should be used to prepare students for the 'real world'. However, most participants reported their use of ICT being for teacher productivity and efficiency, with only some (mostly teachers) also using ICT as a learning tool for students. It was noted at the end of the project that many pre-service teachers' beliefs included recognition of ICT as a learning tool for students, and a large number of lecturers and pre-service teachers believed student engagement was increased when ICT was embedded in learning. Most importantly, there was a closer alignment of beliefs with their intended practice in relation to the use of ICT as a learning tool for students.

Criteria to measure the effect on students' learning of embedding ICT

The development of criteria and related measures to assist the participants to report on the value-added to learning of the embedding of ICT was an interesting activity. While team members agreed about the nature of these criteria they found the creation of specific criteria difficult and the development of related measures quite challenging, despite some input of ideas and professional conversation about the concept. Some criteria developed focused on technology skills, more akin to conventional outcomes, but others focused on non-technology skills and on behaviours. The non-technology skills included attitudes and adeptness at using L2L strategies, and planning and implementing projects. Behaviours included communication, ability to work cooperatively, reaction to constructive criticism, engagement in unfamiliar situations, group behaviour, confidence and autonomous learning. These behaviours are the most powerful of the criteria as they are representative of the value-added to the learning process itself.

Although the related measures developed for the criteria required description of a variable and how it could be captured, e.g., level of teacher intervention captured by observation, many learning teams only included the method of capture, e.g., capacity matrices, 'thinking-hat' reflections and consensograms. It is noteworthy that these were often the L2L strategies that the teams had incorporated into their projects. The in-school project specifications had required that L2L strategies be incorporated as part of their project design for use with the ICT, but there was no requirement that these had to be the methods of capture for the measures of value-added criteria being developed. Of interest were the observations of teacher practice made by the CAP consultant after the project. She noted a change in approach to L2L strategies in conjunction with embedding ICT. While the strategies had previously been used mainly to aid learning by allowing students to self-assess and reflect, teachers were now using the strategies to record student learning. Thus the L2L strategies have become part of the profile of students' developing learning. This is expanding the repertoire of possible measures that allow the teacher to report on the impact of ICT on student learning and thus demonstrate the value-added to learning.

Innovation and evidence of success

This project was innovative in that it 'piggy-backed' on existing projects and structures, targeted ICT leadership in schools, promoted equality of roles in partnerships, focused on classroom students in the in-school projects, integrated ICT and L2L into learning and provided an opportunity for professional learning for lecturers. A strong network of teachers in CAP schools already existed and they were undertaking extended programs of ICT-related professional development and sharing. The CAP structure includes an area consultant who facilitated contact with the schools and undertook two ICT-related projects in 2005 that became the focus of initial professional sharing for the project. ICT leadership in schools was targeted by choosing teachers who were identified as leaders in the current CAP professional development work being undertaken. These teachers were leaders in their schools in relation to both ICT and L2L and were committed to broadening the audience for their work and developing professional links with the university. The partnership was innovative at the learning team level in that it was structured to encourage an equal status within the team for each of the three participants. Each teacher, pre-service teacher and lecturer was expected to contribute to the learning team and also to benefit from being part of such. This was especially important for pre-service teachers who experienced a professional connection with teachers, thus giving them a different status from the usual professional experience where they are being assessed on their actual teaching.

Although the partnerships being trialled were at the participant and institution level the focus for the collaborative activity, the in-school project, was on the classroom and student learning. Prior projects conducted by other researchers have focused independently on embedding ICT in learning and the use of L2L strategies in learning, whereas this project addressed the linking of ICT and L2L. Most viewed L2L as a support mechanism for ICT, but some also used ICT to support the L2L. The focus on measuring the value-added prompted participants to reconsider how to measure the effect of embedding ICT in learning. Finally, the project was innovative in that it provided a professional development opportunity for lecturers to bring them up-to-date with the professional journey of the CAP-school teachers. The lecturers attended the Apollo Parkways Primary School Practicum prior to local project activities and hence were able to engage in the same professional conversation as the teachers.

The success of the project is observable at all levels. The final activities of the project recognised the contribution of all participants, which had been fostered by trying to develop a partnership with equal status for all. Participants have also used the collaborative relationships developed to connect in the implementation of other projects. The focus of the professional learning on metacognition helped to consolidate the partnerships and provided a focus for CAP teachers for long-term projects. Finally, and most importantly, there was growth in student learning demonstrated as a result of the teachers trialling the value-added criteria.

Partnerships

Collaborative partnerships need to be nurtured for a sufficient length of time to allow a strong professional relationship to develop. The five months involved with this project was not really long enough, given its part-time nature in terms of participants' other commitments. The partnerships also needed to be provided with sufficient time to plan their collaborative activities. Although the partnerships were designed in this project for each participant to have equal status it did not mean that each participant made the same type of contribution to the mix. Each participant made different contributions to the learning team, was allocated different roles during the project and experienced different outcomes. Outcomes of the partnership have been short-term and long-term. Already there has been evidence that the partnership has elevated participants into new roles and has encouraged them to reflect on their own practice. Projected long-term outcomes for teachers include reconsidering how they might assess their students in different ways and also their professional links with the university. For lecturers, outcomes include examining the nature of the pre-service teachers' learning program and professional experiences and nurturing links with best practice schools.

Future of pre-service education and professional learning for teachers

Two issues that need to be addressed to allow a similar professional development program to be offered to future cohorts of pre-service teachers are the need to expand the partnership from teacher-level to school-level, and the need to integrate more of the experience into the conventional pre-service teacher program. The teacher-level focus, linking just one teacher at each school with the learning team, needs to be expanded to school-level, linking a number of teachers at one school with the learning team. With the teacher-level focus that was taken, the relationship developed between the teacher and the lecturer and/or the pre-service teacher rather than the school and the university. This has already detracted from sustainability because out of the eight teachers involved four have moved on to other schools, three of which are outside the UNE professional experience catchment area. Consequently contact with these four schools has been lost. Future design should base a learning team at a school and link one lecturer to a number of teachers and pre-service teachers, all of whom are working towards a similar teaching-based goal. Relationships would then be more likely to be ongoing and mutually beneficial, although such a structure would present difficulties in terms of the magnitude of school commitment. A variation on this expansion which has potential for productive outcomes would be linking two lecturers to each school, with respective expertise in ICT and L2L.

The pre-service teacher involvement needs to be incorporated into a course of study rather than being an additional load to their regular program. The pre-service teachers did not express this concern, nor did it detract from their enthusiasm, but they were restricted by the amount of time they could commit to the project due to the pressures of their other work, including professional experience in a different school. The completion of professional experience in the project school, which the delayed timing of the project did not allow, would be a powerful factor favouring sustainability. The integration of such professional development activities into the mainstream teacher education program would enable better utilisation of university staff and resources and optimise the pre-service teachers' use of time. The dilemma, however, is that the closer the professional development model is linked to mainstream activities and compulsory professional experience, the more difficult it becomes to maintain a collaborative relationship where the pre-service teacher feels that he or she is operating on a professional level equal to that of the teacher and lecturer. To sustain the professional equality that the pre-service teachers identified as important in this project will be difficult if they are placed in a normal professional experience situation that is being assessed by teachers/lecturers.

Participants in the current project were united in their desire for the pre-service teachers' professional experience component to be completed in the participating school. Funding is a strong factor militating against the successful implementation of this desire. Pre-service teachers undertake placements they can afford, which usually involves living with relatives or friends. Travel and accommodation costs are prohibitive for most students to undertake more remote professional experience. Many rural teachers would be willing to accommodate pre-service teachers, but this situation is not ideal because of the status differences that are inevitably involved. In order to incorporate a professional experience component in professional learning models more funding needs to be made available to support such placements.

Management of partnerships and professional learning projects

While the previously mentioned 'piggy-backing' on existing structures and projects provided a strong base for the project, the operations of the management team and the steering committee were critical to the project's success. The three people in the management team developed a strong working relationship over the life of the project. This stimulated enthusiasm for the project, which helped compensate for the strong reliance on goodwill that was called upon. The close physical proximity of the management team, two on-site at UNE and one 90 minutes drive away, meant that monthly management meetings were possible, supported by teleconference linkups when necessary. A good line of communication was established within the management team and between the management team and the rest of the participants using a password protected EiL site on WebCT, as well as more

conventional forms of communication including e-mail and telephone. The steering committee comprised representatives of the various educational jurisdictions. It met three times to provide valuable background information and to comment on the various activities planned and documents produced, including this final report. There was, however, the feeling that the role of the steering committee could have been strengthened by giving it a more specific role to improve its contribution to the project.

Regardless of how well management groups function there will still be factors that adversely affect the management of the project. In this project such factors included other commitments, quantity of paperwork involved, short timeframe and lack of resources. As with most educators today, the busy workload of all participants meant other commitments continually impinged on the capacity to allocate quality time to the project. This problem could be partially alleviated by incorporating as much as possible of such collaborative partnership projects into the normal workload so that it becomes part of the daily activities normally completed by the participants. A significant issue with management of the project at UNE was the quantity of associated paperwork. This included the contract, ethics clearances and intellectual property documentation. There is no clear solution here, but as many opportunities as possible are taken to use previously completed documentation to inform each submission. The strong support staff at the SiMERR National Centre assisted greatly in this regard. The short timeframe had an effect at a number of levels. The amount of time that could be allocated for in-school project planning was less than ideal and the project could not be synchronous with the pre-service teachers' professional experience period in schools. The latter in particular affected the time that the pre-service teachers had for interaction with school students. The lack of expected resources, both equipment and professional development courses, meant that the schools had to continually make adjustments to their in-school projects, which ultimately affected the ability of the in-school projects to provide the relevant outcomes to help inform the project.

There were some within-team actions that affected the management, in particular the quantity of data collected and the lack of facilitation of the Learning Community. The quantity of qualitative data collected to address the three research questions necessitated much more management time than anticipated in terms of analysis and reporting. Although the quality of the data informed the project well, better preparation of data collection forms in the future could reduce the workload in this area. Facilitation of interaction at the Learning Community level of the model was successful at the face-to-face meetings but not in the online environment. The provision of professional reading and posing of questions to reflect on professional learning would have facilitated the community level online.

Conclusions and recommendations

Conclusions of local research project

What can be designed into our professional development model (learning teams in a learning community) to create a more collaborative partnership? Although all participants appreciated the opportunity to collaborate as part of a learning team, they identified weaknesses with the design of the professional development model and in many cases proposed suggestions for future improvement.

The design features that worked well in fostering collaboration include:

- informed choice of participants;
- the nature of the relationship between the learning team members with an equal professional standing for all;
- relationship building between the UNE-based participants (lecturers and pre-service teachers);
- face-to-face communication at the professional sharing days including focused collaborative activities (successful both within-team and across-team);
- online environment for ongoing communication (with modifications).

The design features that could be improved to foster collaboration include:

- clarifying lecturer and pre-service teacher role in the learning team;
- aiding teachers to share control of their planning for teaching and learning;
- providing more time to plan and evaluate, including discussion of presentations at the professional sharing days;
- providing more opportunities for face-to-face communication, especially site visits;
- designing clear mechanisms for communication between school students and pre-service teachers (and the related role of lecturers) that reflect local conditions.

Benefits of being involved in the project generally, and in the partnership in particular, have been identified at the institution and the personal level.

Benefits for UNE include:

- access to schools displaying exemplary practice in the embedding of ICT into teaching and learning;
- stimulus to renew equipment in computer laboratories used by pre-service teachers;
- creation of new lecturing position, in the School of Education, that involves an equal distribution of workload between the ICT education team and the learning and teaching team;
- strengthening of links between the SiMERR National Centre and regional and remote schools.

Benefits for UNE lecturers include:

- better awareness of the effect of embedding ICT and L2L in learning;
- rethinking of practice by lecturers involved in ICT education to incorporate L2L strategies into their courses;
- rethinking of practice by lecturers involved in learning and teaching to incorporate more ICT into their courses;
- strong collaborative relationships developed with teachers in CAP schools;
- opportunity to influence teacher perceptions of pre-service teacher education.

Benefits for pre-service teachers include:

- better awareness of the effect of embedding ICT and L2L in learning;
- strong collaborative relationships developed with teachers in CAP schools;
- opportunity to inform teacher perceptions of pre-service teachers;
- professional experience placements in rural and remote schools is being reconsidered.

Benefits for CAP schools include:

- enhanced relationship with the key tertiary education provider in the Northern Network area;
- opportunity to influence perceptions and practice at UNE School of Education through closer professional relationships with lecturing staff;
- opportunity to influence perceptions and practice of pre-service teachers in regard to teaching practice;
- opportunity to influence perceptions of pre-service teachers in regard to the advantages of working in rural school settings;
- raised profile of CAP schools as desirable locations for pre-service teachers for professional experience and final placement.

Benefits for teachers include:

- recognition of exemplary practice in embedding ICT into teaching and learning;
- opportunity to extend professional learning in a new area through reflective practice and collaborative research;
- improved understanding of processes to evaluate current practice and the role of research in establishing new directions;
- affirmation of current practice;
- strong personal relationship with staff from School of Education SiMMER.

Implications for pre-service and professional learning programs locally

What can be designed into our professional development model to promote professional learning? The design features that worked well in promoting professional learning include:

- opportunity to showcase and affirm practice;
- stimulation of ideas to rethink practice;
- opportunity to participate in research into the measurement of improvements to learning.

The design features that could be improved to promote professional learning include:

- provision of relevant literature for professional discussions;
- questions to stimulate discussion at the learning community level;
- structures and activities to support beyond-team communication, i.e., to the wider learning community;
- opportunity to publish work more widely;
- provision of academic recognition for pre-service and in-service teacher participation.

Implications for future partnerships nationally

What can be designed into a professional development model to create a collaborative partnership? Based on the NSW local experience, suggestions for developing professional development models that support collaborative partnerships include:

- select participants who are committed to learning and willing to be challenged;
- build on professional knowledge and structures that are already established;
- give participants a real focus for their collaboration;
- clearly define the roles of all participants;
- provide clear mechanisms for communication;
- provide opportunities for face-to-face communication;
- provide sufficient time for the relationship to develop;
- provide communal sharing to encourage project completion and affirmation.

An exciting development to strengthen implementation could be the expansion of professional development models to include collaborative research teams across tertiary institutions. The EiL learning team model, for example, could usefully be expanded to involve collaboration of lecturers at more than one university being part of a learning team at different schools implementing the same project. This arrangement would allow for comparative research opportunities, as well as professional networks of support and interaction. Such linking of teams would be beneficial for cross-institution sustainability. With a strong commitment to cross-institution projects, there could simultaneously be positive implications for sustainability at the local within-institution level. Just as the learning teams in the current project benefited from the collaborative approach and achieved the shared deadlines because of their commitment to their team, cross-institutional teams would presumably experience

this same feeling of commitment. Such feelings are essential for sustainability of a project at any level. With cross-institution projects there would also be opportunities for cross-institution networking of pre-service teachers and development of further roles for them, such as reporting at various stages of each other's project.

Implications for pre-service and professional learning programs nationally

What can be designed into a professional development model to promote professional learning? Based on the NSW local experience suggestions for developing professional development models that promote professional learning include:

- professional discussion of relevant literature;
- stimulation for discussion;
- structures and activities to support communication with the wider education community;
- opportunities to publish work more widely;
- academic recognition of professional learning.

The EiL project at UNE would like to acknowledge the opportunity that DEST funding of the PICTL study has provided to trial their learning team model for professional development. This has allowed the teachers, pre-service teachers and lecturers involved to re-examine their practices and it has provided the stimulus for UNE to consider professional development alternatives in its teacher education program. Invaluable to this project in particular, and to rural and remote schools more generally, is the enthusiasm and energy of the CAP network of schools and the consultants who organise that network.

References

British Educational Communications and Technology Agency (BECTA) (2002). *The impact of ICT on teaching and learning: what the evidence shows*. Retrieved 26 March 2005 from http://www.becta.org.uk.

Broadie, R. (2003). Measuring impacts and benefits of ICT-for-learning, *Computer Education*, vol. 105, pp. 3–8.

Department of Education and Training (DET) (2003). *Quality teaching in NSW public schools: Discussion paper*. Sydney: DET Professional Support and Curriculum Directorate.

Department of Education, Science and Training (DEST) (2002). *Making better connections: Models of teacher professional development for the integration of information and communication technology into classroom practice*. Retrieved 26 March 2005 from http:/www.detya.gov.au/schools/publications/2002/professional.htm

Cornish, L., Kite, G. & Cecil, P. (2006). 'Promoting thinking in a rural classroom with ICT and 'Learning to Learn' strategies', paper to be presented at the Australian Computers in Education Conference, Cairns, Australia, 2–4 October 2006.

Reading, C., Cornish, L. & Belford, S. (2006). 'Measuring the value-added contribution of embedding ICT in learning', paper to be presented at the Australian Computers in Education Conference, Cairns, Australia, 2–4 October 2006.

Reading, C., Lloyd, L. & Belford, S. (2006a). *Embedding ICT in Learning (EiL): Collaborative Partnership for Rural Schools Research Report*. Armidale, NSW, Australia: SiMERR National Centre, University of New England.

Reading, C., Lloyd, L. & Belford, S. (eds) (2006b). *Embedding ICT in Learning (EiL): Collaborative Partnership for Rural Schools School Project Reports*. Armidale, NSW, Australia: SiMERR National Centre, University of New England.

Creating powerful computer-supported learning environments through partnerships for professional learning

REPORT FROM THE WESTERN AUSTRALIA PROJECT

Paul Newhouse, Centre for Schooling and Learning Technologies (CSaLT)
Julie Hewson, Edith Cowan University

Executive summary

This project built on a long-term partnership and commitment to a group of schools by working with two schools that were seeking to reform the integration of ICT within a whole-of-school philosophy. The project aimed to demonstrate an effective and efficient model for improving teacher practice in the use of ICT in schools while at the same time providing pre-service teachers with more relevant experience in the integration of ICT in teaching and learning. A secondary aim was to better connect academics with such practice in schools and provide a basis for some action research into the use of ICT to support student learning.

The project centred on supporting a substantial number of teachers in a school to plan, implement and evaluate new applications of ICT to learning. It provided teachers with an action learning model of professional learning with support from a pre-service teacher and at least one or more academics. It provided the opportunity for teachers to receive credit in the university's Credentialed Professional Learning Program. Teachers worked collaboratively with pre-service teachers and academics in a mentored action-learning mode to implement new applications of ICT support for learning in a relevant component of the curriculum. The academics supported teachers who used action research to reflect on aspects of the implementation of ICT support for learning, with a view to improving further implementation and encouraging a more routine implementation of appropriate forms of ICT support. The whole process was supported with online resources.

The success of the project was considered from the perspectives of the four groups of participants: teachers, pre-service teachers, school students and academics. Data were collected through questionnaires and documents. Observations from the other groups of participants were used to triangulate data collected from each group of participants. For example, pre-service teachers were asked for their perception of the success of the project for them, but this was then compared with the assessments made by the teacher involved and the degree of success of the implementation in the classroom.

The main conclusions arising from the study were:

1. The partnership model implemented in the project using action-learning and action-research paradigms was successful for many of the teachers and pre-service teachers but not for the academics.
2. Involving a substantial group of teachers from a school in a school-based professional learning program enhances the outcomes, particularly with regard to the quality of professional conversations. This was also likely to be an advantage for pre-service teachers.

3. Lack of time for investigation, reflection and planning continue to be a major constraint on the involvement of teachers, with some paid teacher relief necessary. The project needed to include more support for evaluation and reflection. As a result teachers need considerable incentives to become fully involved.
4. The perception of pre-service teachers that experience and expertise in facilitating computer use by students is both a non-necessary component of teaching and accreditation for teaching is the main constraint on their involvement.
5. When partnerships between teachers and pre-service teachers work on new applications of ICT to teaching and learning there are advantages in allowing the teachers to lead the innovation with the pre-service teachers in support.

Recommendations arising from these conclusions are as follows.

1. Teacher accreditation needs to include a reasonable level of expertise and experience with using ICT and facilitating ICT use by students to support learning.
2. The connection between ICT competencies within teacher accreditation and pre-service teacher education needs to be strengthened.
3. Evaluation and review of teacher education programs should include a focus on the inclusion of a variety of experiences with educational technology.
4. School-based research needs to be supported with findings disseminated to inform practice in schools through professional learning programs.
5. Teacher education courses need to be resourced as a science not as humanities.
6. Sustainable and effective strategies for in-service teacher professional learning for the integration of ICT in schools needs to be supported.

Purpose of the project

This project built on a long-term partnership and commitment to a group of schools by working with two schools that were seeking to reform the integration of ICT within a whole-of-school philosophy. The project implemented a model of professional learning for teachers, pre-service teachers and academics built on research conducted in the School of Education at Edith Cowan University (ECU) over a number of years. The overall aim was to promote the development of powerful computer-supported learning environments for students in schools by providing a model of professional learning for teachers, pre-service teachers and academics designed to increase their professional ICT capability.

This project aimed to establish long-term partnerships and commitments to schools or groups of schools seeking to improve the integration of ICT within a whole-of-school philosophy. It provided teachers who supported pre-service teachers with credit in the university's Credentialed Professional Learning Program. Pre-service teachers worked collaboratively with teachers and academics in a mentored action-learning mode to implement new applications of ICT support for learning in a relevant component of the curriculum. The academics will support teachers who use action research to reflect on aspects of the implementation of ICT support for learning with a view to improving further implementation and encouraging more routine implementation of appropriate forms of ICT support. The whole process was supported with online resources.

Professional learning strategy underpinning the design

The main professional learning strategy focused on the needs of the teachers involved, but involved the pre-service teachers and to a lesser extent the academics. Where possible links were also made to the pre-service teachers' courses through specialist ICT-related units of study and the requirements of their teaching practicum.

The main professional learning strategy was built on a whole-school mentored action-learning with research model. Separate programs were developed for each of the two schools involved. These supported teachers in developing a new idea in the use of ICT to support the learning of students in their classes. The aim was to implement this idea, with the support of a pre-service teacher, during a practicum. A university mentor was available to provide some guidance in assisting teachers at the school to use an action-research project as a way of informing curriculum and/or pedagogical planning.

Teachers were involved in the university's Credentialed Professional Learning (CPL) Program, with 12 hours of face-to-face and online modules of professional learning instruction supported by online materials to complete an action-learning project in the school (to be credentialed this is assessed by an academic). Pre-service teachers had the opportunity to participate in some or all of these learning programs. The pre-service teachers and teachers, with support from the university staff, designed a classroom-based action-learning project which was implemented during professional practice. This enabled teachers and pre-service teachers to move beyond awareness of the capacity of ICT to support learning environments and implement the ideas in classrooms within a supportive peer culture. The reflection phase of action learning enabled teachers and pre-service teachers to learn from their reflections, a process which needed to be mentored to ensure deep learning, supported by a theoretical reflection.

Context

The School of Education at ECU is the major provider of teacher education in Western Australia, training about 70% of all teachers in the state. The institution gained university status in 1991, previously having been a College of Advanced Education formed from the merger of all of the teachers' colleges in Western Australia. It has always been considered a leader in curriculum reform, with many of its staff being involved in the development of the outcomes-based curriculum for schools and new post-compulsory courses of study over the past two decades. The School has always been a leader in the state in encouraging the use of ICT to support learning and this has culminated in the development of the Centre for Schooling and Learning Technologies (CSaLT), one of only two research centres in the School. The School has developed a philosophy of embedding the use of ICT in teacher education programs as well as providing some specific training in the use of ICT. The School has developed a program of partnerships with schools in the Swan and Joondalup Education Districts for the provision of professional (teaching) practice for pre-service teachers. The schools take on more responsibility for the supervision of pre-service professional practices and become involved with the university in research and professional learning.

Local curriculum reforms and programs

In Western Australia considerable resources have been deployed over the past decade to promote the use of an outcomes-based curriculum and to incorporate the use of ICT in the learning environment to move towards more learner-centred pedagogies. As a part of this, a large amount of resource development and teacher professional development has occurred, but seemingly with little impact to this time.

Within the next few years all K–12 education will be notionally based on the WA Curriculum Framework that comprises overarching learning outcomes and eight learning areas, each with outcomes. The Curriculum Framework espouses principles of teaching, learning and assessment that are principally based on the constructivist view of learning. At the same time the government school sector has embarked upon a multi-million dollar initiative with a curriculum focus (originally called the 100 Schools Project) to increase the use of ICT in schools, and an online professional learning strategy, *Teachers Have Class*, provided through *SchoolKit*.

Pre-service teacher education at Edith Cowan University

The pre-service teachers involved were either completing the four-year Bachelor of Education (Primary) degree or a one-year Graduate Diploma of Education (Secondary) as a second degree. The Bachelor of Education (Primary) degree includes a four-week professional practice in the second semester of the third year, and the Graduate Diploma of Education (Secondary) includes a six-week professional practice in second semester.

The Graduate Diploma is delivered exclusively within the School and comprises eight units of study. Only one unit is an elective providing the opportunity to select a unit focused on the use of ICT (two such units exist, one for beginners and one for more-experienced users). Pre-service teachers select a major and minor area, one of which can be *Computer Education* if they aim to teach computer-related studies in a secondary school.

The Bachelor of Education (Primary) is largely delivered within the School, although pre-service teachers can choose a number of general studies units from other Schools at ECU. In the first year, pre-service teachers complete a multi-literacies unit that involves a module (one third of the unit) on ICT literacy. In third year they complete a unit on technology education that includes a module on using computers. Pre-service teachers may also choose general studies or elective units that involve learning to use computers, or learning to facilitate the use of computers to support student learning. There are two units delivered by the School that fit the latter category, *Computers in Primary Schools* and *Teaching Methods Incorporating Computers*. These units are typically selected in either the third or fourth year of pre-service training.

The School has developed a philosophy of embedding the use of ICT in teacher education programs, as well as providing some specific training in the use of ICT. For example, the School has implemented LessonLab software to incorporate the use of video analysis in the conceptualising of teaching practice from the first year of the primary and early childhood education programs. Another example is the use of action-learning modules using ICT in the professional practicum in the K–7 program. The extent to which pre-service teachers have experience with this embedding of ICT is entirely dependent on unit coordinators, lecturers and tutors. Unit coordinators determine the learning experiences included within a unit, with lecturers and tutors then responsible for delivery that may or may not fulfil the intentions of the unit coordinator. For example, all units have a Blackboard online presence, but which facilities are used and how they relate to the learning experiences of the unit vary considerably.

The professional practicum has always been a critical component of pre-service teacher education at ECU. A few years ago, to improve this component of courses and to respond to pragmatic issues concerning the logistics of such, a school partnership program was instituted that particularly focused on the Swan and Joondalup Education Districts of the state school system. While pre-service teachers at ECU are expected to complete a range of reflective tasks during their practicum, and several units of study have been redesigned to support the practicum, there is reluctance to place other requirements related to other units of study. Therefore, while a unit of study may draw on experiences from the practicum, it may not make demands on pre-service teachers while on practicum. That is why, for this project, the ECU pre-service teachers had to volunteer and sign an application form indicating their willingness to undertake this additional requirement.

Post-graduate professional learning for teachers at ECU

The School of Education offers a typical array of post-graduate certificates and degrees by coursework and/or research for the professional learning of teachers.

For the provision of professional learning for teachers the School has developed a philosophy of providing credentialed professional learning that incorporates action-learning. Teachers complete one module of a three-module unit in a graduate certificate or masters course by attending 12 hours of face-to-face or online instruction and then implementing an action-learning component in their school based on that instruction. This has occurred through school-based in-service courses, intensive institutes, conferences and private providers. Those involved in this project have already had some involvement with this model with the School of Education.

Educational computing at Edith Cowan University

The School of Education has always been a leader in the state in encouraging the use of ICT to support learning. This has culminated in the development of the Centre for Schooling and Learning Technologies (CSaLT), one of only two research centres in the School and designated a Level II research centre by ECU. The centre won a $500,000 project with the State Education Department to evaluate the use of ICT in a set of their schools over the period 2003 to 2007. The Centre has gained other research grants and also has a full-time post-doctoral scholar.

The mission of the Centre is to support activities of the School of Education at ECU that improve schooling in Western Australia and maximise the effective use of ICT to support teaching and learning in schools. These activities will include supporting the development of teaching and ICT-related skills and understandings with pre-service and practising teachers, working directly with schools and school systems to improve schooling practices and the use of ICT to support learning and teaching. They will seek to add to knowledge in these areas by conducting relevant research. The general aims of the Centre are to:

1. Promote research into improving schooling and into the application of ICT to improve teaching and learning;
2. Support the use of ICT by School of Education staff to support teaching and learning;
3. Provide teacher professional learning; and
4. Provide consulting services to schools and school systems.

These aims are focused on improving learning outcomes for school students through the use of ICT. The Centre is involved in activities related to the four general aims in the areas of Research, Teacher Professional Learning, Consulting, and Services to School of Education.

Nature of the participants

There were two groups of teachers involved, one from a large well-established senior high school and the other from a very new, growing primary school. Although the senior high school was well established, most of its buildings had recently been replaced and over the past few years the leadership had incorporated a range of new approaches into the school such as middle-schooling, trolleys of laptop computers, and a new emphasis on the Arts and LOTE. The primary school had an unusually high proportion of younger teachers and younger students. In both schools one of the administration team promoted the project and was an enthusiast for the use of ICT in schools.

There were two groups of pre-service teachers to match the two groups of teachers. A group of secondary pre-service teachers was selected from the one-year Graduate Diploma of Education course. A group of primary pre-service teachers was selected from the third year of the Bachelor of Education program. These two courses were selected because they had a professional practicum at the appropriate time, pre-service teachers had access to an ICT-related unit, and they were large enough cohorts to be able to match the needs of the teachers involved.

Almost all the academics were full-time at Edith Cowan University, although the two main instructors were casual members of staff. All academics were selected for their capacity to identify with the needs of the teachers involved.

Factors affecting the project

The main factors affecting the project were timing and time available. The project commenced over six months later than planned and therefore the groups of pre-service teachers enlisted had to be changed. The short duration of the project limited the choice of schools to be involved. At least two schools with a substantial number of teachers willing to participate were needed. The lack of time meant that the instructional modules had to be hurried, there was little time for reflection at the end, and it was difficult to have planning and evaluation documents returned by teachers.

A research agenda and background

For a number of years a small number of academics and colleagues have been working with the Centre for Schooling and Learning Technologies (CSaLT) at the School of Education of Edith Cowan University to refine a model of teacher professional learning to support improved integration of student ICT use. This was formalised in the work of Newhouse, Trinidad and Clarkson (2002). Research has shown clearly that such a model needs to be school-based and within a supportive school environment that includes the school leadership, particularly the Principal. Further, such a model needs to provide 'just-in-time' learning. It also needs to influence the teachers' beliefs and, thereby their pedagogy. These requirements lend themselves to the action-learning, action-research basis for the model now being delivered through CSaLT.

A number of Department of Education Science and Technology (DEST) funded studies have proposed frameworks for teachers (DEST, 2001, 2002). In the DEST (2001) report *Making better connections*, professional learning for teachers supported through partnerships between universities, schools and school systems was recommended. This project built upon that recommendation. The project also built upon the suggestion of Newmann and Wehlage (1995) that the organisational capacity of a school determines its ability to accept and commit to change and that this capacity "is enhanced when schools are shaped into professional communities" (p. 30).

A key aspect of the model was that the teacher took responsibility for the planning, implementation and evaluation processes with the pre-service teacher and academic supporting these processes. This built on the understanding that to become proficient at supporting students' use of ICT requires four or five years of teaching experience in addition to possession of relevant ICT skills and understandings (e.g., Becker, Ravitz & Wong, 1999). While pre-service teachers may possess many of the ICT skills and understandings, they can not be expected to have experience sufficient to take on the responsibility in this situation.

The project also built upon plans by the School of Education at ECU to continue to expand the number of schools involved in professional practice relationships and credentialed professional learning programs. This project provides an opportunity to conduct research that will inform the fine-tuning of these plans.

Partnership

The aims of our partnerships are in line with the PICTL study definition for a partnership: "Regular and sustained exchange of people, ideas and projects. People build relationships in the partnership through exchanges and use the synergy of the relationships and activities to initiate further ongoing and sustained activity."

Nature of the partnership in project

The partnership program in the School of Education focuses primarily on the delivery of professional practice experience to pre-service teachers. It also has a focus on conducting research and providing professional learning for teachers and academics. The Swan partnership program has a steering committee (members from ECU, the District Office and the schools) that meets about once a month.

ECU has forged strong links with Western Australian schools over many years. In recent times it has worked with school principals to formalise these links through professional partnerships. Partnerships are voluntary associations. Their overarching aim is to strengthen the professionalism that arises from the collaboration between colleagues from the school and university sectors. The partnerships can be very beneficial for our pre-service teachers. They find that they have more productive practicum experiences when they are placed in schools with strong links to our programs. The close links enable ECU staff to keep in touch with new school developments and to identify teachers of best practice. The partnerships also benefit schools.

- We have undertaken innovative curriculum and research in partner schools where we share our expertise. For teachers who take part, the professional development can be credited to academic awards.
- Through our partner-school networks we have invited staff to seminars led by our academic staff or visiting fellows. We also run professional development in partner schools that are credited towards university qualifications.
- ECU courses have been modified to allow pre-service teachers to work in schools under supervision with a small group of students requiring intensive help.
- We have invited teachers from partnership schools to give guest lectures in areas of expertise or best practice occurring in their schools.

Partnerships can be formed between any school that has links with ECU from all three education sectors: government, Catholic and independent.

Purpose of the partnerships in project

The purpose of the partnerships is to strengthen the relationships with the schools in order to shape how the university prepares pre-service teachers for practice teaching. Partnerships also represent a better way of providing pre-service teachers with the experiences they need in implementing ICT support for learning in real settings and aim to support schools in making better use of ICT to support learning. The existing partnership structure at ECU was an excellent vehicle for the project as it provided a structure within which locating the components of the professional learning would have relevance and synergy. In particular it provided a means of linking experienced teachers with university pre-service teachers in ways that could be perceived to be beneficial to both parties. In addition, the partnership structure ensured that the project would have the support of the leadership in the schools and at the university, thus making it easier to secure the participation of teachers, pre-service teachers and academics.

Project design

Description of project

This project established a long-term partnership and commitment to a school or group of schools seeking to reform the integration of ICT within a whole-of-school philosophy. It provided teachers who supported pre-service teachers with credit in the university's Credentialed Professional Learning Program. Pre-service teachers worked collaboratively with teachers and academics in a mentored action-learning mode to implement new applications of ICT support for learning in a relevant component of the curriculum. The academics assisted teachers who used action research to reflect on aspects of the implementation of ICT for learning, with a view to improving further implementation and encouraging a more routine implementation of appropriate forms of ICT support. The whole process was supported with online resources. This relationship will shape how the university prepares pre-service teachers for practice teaching by providing them with the experience they need in implementing ICT support for learning in real settings.

There were four main research questions associated with the project.

1. Is a strong relationship with a university likely to support a school in developing consistently good practice in the use of ICT in the provision of the curriculum?
2. Can pre-service teachers and their lecturers lead school-based action-learning projects as an integral part of a professional practice experience?
3. What are the conditions that need to be sustained in a professional partnership between universities and schools if pre-service teachers are to be able to demonstrate their knowledge and skills?
4. In a professional development school, does the quality of professional conversations about ICT in learning increase because of the contributions of university staff and pre-service teachers?

Plan and implementation

The "Whole-school mentored action learning with research and credentialed professional learning" model was implemented at both schools. The following provides an overview of the main tasks involved in the project.

1. Samples of teachers, pre-service teachers and academics selected; background data collected using questionnaires; the professional learning program planned with online component produced by 19th August, 2005.
2. Face-to-face component of the credentialed professional learning program completed at both schools by 23rd September, 2005.
3. Implementation of action-learning project in classrooms completed 24th October to 25th November, 2005 during teaching practice periods.
4. Research data collection through questionnaire and interviews with teachers, pre-service teachers and academics completed 12th September to 9th December.
5. Action-research reports (planning and evaluation document) completed by 19th December 2005.
6. Overall project research report completed by 12th April, 2006.

Credentialed Professional Learning Program

The purpose of the learning program instructional modules is to guide the teacher (with pre-service teacher and academic) through the process of planning and implementing new ICT support for a part of the curriculum with which the teacher is connected. The instruction comprises six 2-hour sessions that may be face-to-face, online or a combination of both (termed a "guided discovery"). A brief outline of the six sessions follows.

Session 1: Introduction to concepts — raising awareness (2 hour workshop)

- Computer-supported learning environments for problem solving and cooperative learning: a guide for teacher decision making.
- Sources of ideas and accessing resources.

Session 2: Generating ideas and learning from examples (2 hour guided discovery)

- Teacher and pre-service teacher identify an area of curriculum for ICT support.
- Investigate examples from around the world: searching.
- Project-based collaborative learning with portfolio assessment.
- Seek feedback from academic.

Session 3: Electronic portfolios (2 hour workshop)

- Individual workshop to create an electronic portfolio using PowerPoint as the vehicle to include digital photographs, documents (doc, rtf, pdf), concept maps, existing digital video, audio, etc.
- Skill development in handling a range of file formats and creating audiovisual digital resources.

Session 4: Planning for computer-supported learning (2 hour workshop)

- Planning documents and the use of online support.
- A structure for planning for computer-supported learning.

Session 5: Introduction to creating supporting resources (2 hour workshop)

- Use planning from previous two group sessions as context to develop support resources for curriculum application of ICT.
- Develop website support using a web development tool.

Session 6: Planning a project to use ICT (2 hour guided discovery)

- Teacher and pre-service teacher complete "planner" documents to assist in planning for the computer-supported learning module.
- Seek feedback from academic.

A website is available to support these sessions with online resources. In addition, a Word document template is used throughout to guide the planning, implementation and evaluation processes. This document is provided during the first session and then is used as a collaborative working document by the team of teacher, pre-service teacher and academic. This template was developed from a tool that was part of a teacher professional ICT capabilities model developed by Newhouse, Trinidad and Clarkson (2002) for the Western Australian Department of Education.

Project evaluation

Local critical friend or site evaluator: Dr Sue Trinidad (Curtin University).

The evaluator was provided with summaries of all the data collected by questionnaires, documents and observations and some access to the participants.

Innovation

There was innovation both at the project level and at the individual teacher/pre-service teacher/academic partnership level. The combination of teacher professional learning with pre-service teaching practice and academic mentoring is innovative for teacher education programs. The individual teachers varied in their previous experience in the use of ICT to support learning and

therefore each is doing something innovative (i.e., different and better). For example, one of the participating academics has concluded that the project being implemented by one teacher (with pre-service teacher help) should be reported in a journal, while another teacher has learned to use Chinese characters in word processing with the help of the ECU pre-service teacher. A number of teachers are planning to support students in creating audio-visual materials and a few are planning to provide online interactive learning experiences.

Data collection and analysis

Data collected were concerned with determining the outcomes of the trial using instruments and methods developed for recent projects conducted by CSaLT.

Data were collected from all participants (teachers, pre-service teachers and academics) at the end of their involvement with the project. This took the form of an electronic questionnaire sent and returned via e-mail, followed by a short interview to allow for clarification and expansion of responses. In addition, teachers and pre-service teachers completed a short questionnaire at the commencement of their involvement with the project. Finally, teachers were asked to complete a planning and evaluation document using a template and to submit that as part of the credentialing process.

Data from the questionnaires were analysed using a spreadsheet and SPSS statistical software. The analysis included descriptive statistics, scale analysis and tests for the comparison of means.

The interview data were analysed by transcribing the interviews, summarising the main points for each question for each of the two groups of teachers, and then determining common themes as well as points of difference.

The planning and evaluation documents were analysed in terms of the type of applications attempted, the success of the application and constraints to such.

Overall the implementation and data collection for the project were completed by the end of 2005 as planned, but changes had to be made to the groups of pre-service teachers and the teaching practice blocks involved.

Secondary teachers and ECU pre-service teachers

- Lateness in receiving the contract meant that the group of ECU pre-service teachers was changed so that the Diploma of Education Term 4 final teaching practice could be used, rather than the third-year Term 3 teaching practice. The change may have actually improved the outcome, because these pre-service teachers are enrolled in a specialist ICT elective. This program is the only one that includes pre-service teachers from all the learning areas and disciplines.
- The state school remained involved and contributed 11 teachers across a range of learning areas and with a range of skills and experience in using ICT.
- The private school that was to be involved could not contribute any teachers so it withdrew. The Deputy Principal remained involved on the steering committee.

Primary teachers and ECU pre-service teachers

- Three primary schools that were interested in being involved could contribute a total of only four teachers, so another school was approached. It was able to contribute nine teachers and therefore became the focus for the project.
- Enough Third Year ECU pre-service teachers in the Bachelor of Education (Primary) program volunteered to be involved.

ECU academics

- Enough academics volunteered to be involved to allow each to be associated with between one and three teacher/pre-service teacher combinations.

The project was implemented independently in the primary school and secondary school. In both schools the face-to-face instruction included one 2-hour introductory session followed by a full day two weeks later. For the secondary teachers the instruction occurred on an ECU campus while for the primary teachers it was conducted on the school site. All pre-service teachers were encouraged to attend the full-day instruction, particularly for the middle session, and were encouraged to contact their teachers prior to this day. Teachers were encouraged to contact both their pre-service teachers and academics after the first introductory session.

Results

Initial questionnaires

Both the teachers and pre-service teachers completed a questionnaire that was very similar, although some of the wording was changed to account for the lack of school-based experience of the latter group. There were 19 (90%) returns from teaching staff and 17 (100%) from pre-service teachers. The analyses of these survey data were interpreted in terms of experience and attitude towards computer use, ICT skills and pedagogy in the use of computers. Comparisons can be made between the results for the teachers and pre-service teachers, and between the primary teachers/pre-service teachers and secondary teachers/pre-service teachers.

The first section of the questionnaire related to a teacher's experience, current roles, and level of use of computers. An analysis of these data is summarised in Table 1. There was a high level of teaching experience (average of 15.5 years). This was particularly the case for the secondary teachers where, on average, they had been at the school for over nine years — nearly half their teaching experience. The primary school had been established for just over one year and had a low average age for teachers. Nearly half of all the teachers had been facilitating student use of ICT for five years or more, with the primary teachers generally more experienced at this than their secondary counterparts. Similarly, nearly 50% of the pre-service teachers had been using computers for at least five years, with only one with almost no experience. These data are represented in Figure 1.

Table 1. Summary of teacher questionnaire data on items related to teaching experience, attitude towards, and level of use of, computers

Activity	Number of years /	% of teachers giving response				Mean (SD) (years)	
		0	1 or 2	3 or 4	≥ 5		
Total teaching experience	Primary					10.3	(8.4)
	Secondary					19.7	(9.1)
	All teachers	5.0	0.0	5.0	90.0	15.5	(9.6)
Teaching at present school	Primary					1.0	(0.4)
	Secondary					9.1	(5.8)
	All teachers	5.3	42.1	5.3	47.3	5.6	(6.0)
Facilitating ICT use	Primary					5.5	(0.5)
	Secondary					2.8	(1.0)
	All teachers	9.5	19.0	23.8	47.6	4.0	(1.0)

α Blank responses are included with 0. β Throughout the report SD is used to refer to the Standard Deviation

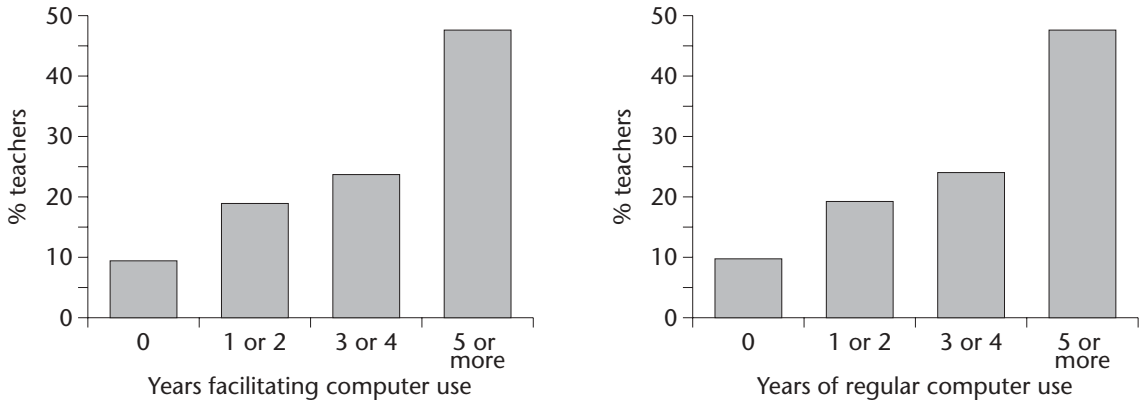


Figure 1. Experience of teachers at facilitating student use of ICT (LHS) and pre-service teacher experience using computers (RHS)

Teachers were asked to estimate the frequency with which they facilitated student use of computers and their preferred frequency. A summary of their responses to items related to their level of use of computers with pre-service teachers and preferred level of use is given in Figure 2. Nearly 40% were interested in facilitating daily use of ICT. The pre-service teachers were asked how often they actually used computers last semester and how often they would like to support student use of ICT when they started teaching.

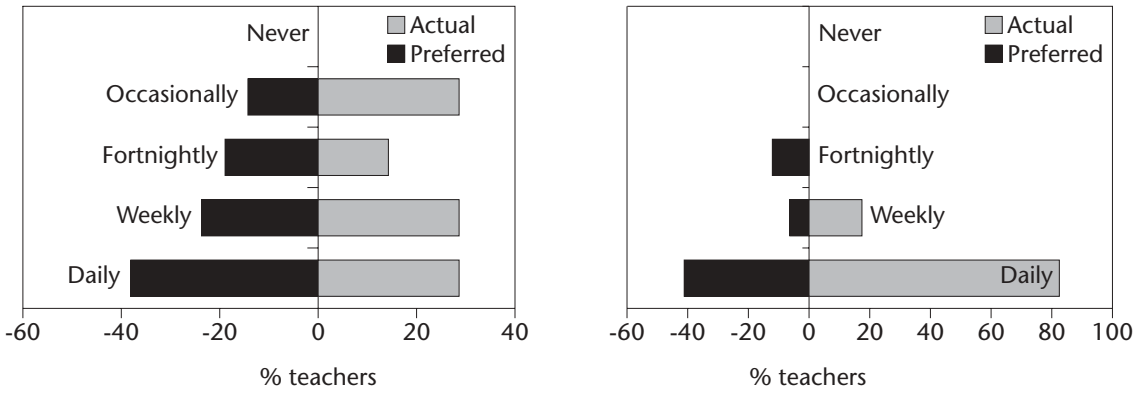


Figure 2. Actual versus preferred ICT usage for teachers (LHS) and pre-service teacher experience using computers (RHS)

Item 4 of the questionnaire requested a self-assessment of operational skill level in using particular computer applications and equipment. This item was based on a set of questions from an online survey developed by the Technology School of the Future for the South Australian Department of Education and Children's Services. The results for all teachers are presented in the upper graph in Figure 3. They show the number of teachers rating themselves at each level for each skill area. Figure 3 also shows the similar graph from the baseline data analysis. A similar rating system was used in all the pre-service teacher questionnaires.

In interpreting the results, the proportion indicating competent or advanced skills are considered as most important. Key results are now listed.

- All had developed at least competent (combined competent and advanced) skills in the operation of word processors and 80% had done so with the use of e-mail.
- The other areas where a majority had developed at least competent skills were Internet research, Digital photography, and File management.
- About 40% had advanced skills in slideshow creation (PowerPoint) and Internet research but over 50% had little skill with slideshow creation.
- Very few had skills with web authoring, spreadsheets, databases and digital video.

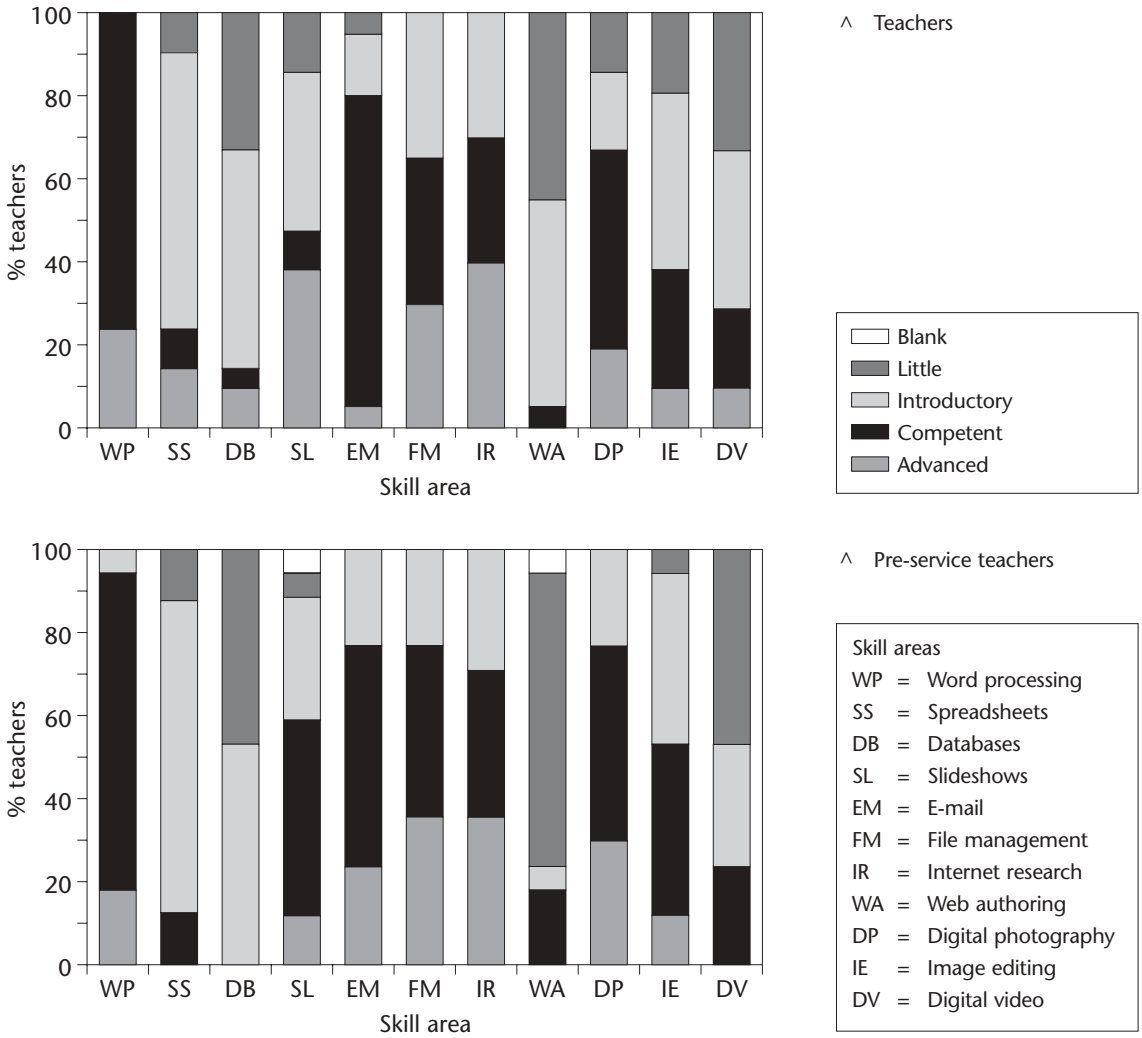


Figure 3. Self-assessment of operational skill level for specified types of computer software and equipment for teachers and pre-service teachers

The results clearly indicate clearly that in most of these knowledge and skill areas these teachers lack a reasonable level of skill. This probably indicates little previous exposure to some of the areas. However, they have very strong skills in areas they probably use regularly for their personal and non-classroom professional tasks (e.g., word processing and e-mail).

The main indicator of teacher ICT-related attitudes came from an item in which they were asked to indicate how they felt while supporting their students using computers. Only one teacher indicated anxiety and only two indicated worry while 33% indicated feeling comfortable, 43% confident and even 10% (two teachers) excited. These results present an overall positive attitude and provide a good platform from which to integrate the use of computers in the curriculum.

The skills data were used to construct a *Skills* scale. A summary of this analysis is given in Figures 4 and 5. On average the skills of the secondary teachers appear to be stronger than those of the primary teachers apart from two or three individuals. The mid-point of the scale is 2.5. Most secondary teachers are above this value but most primary teachers are below.

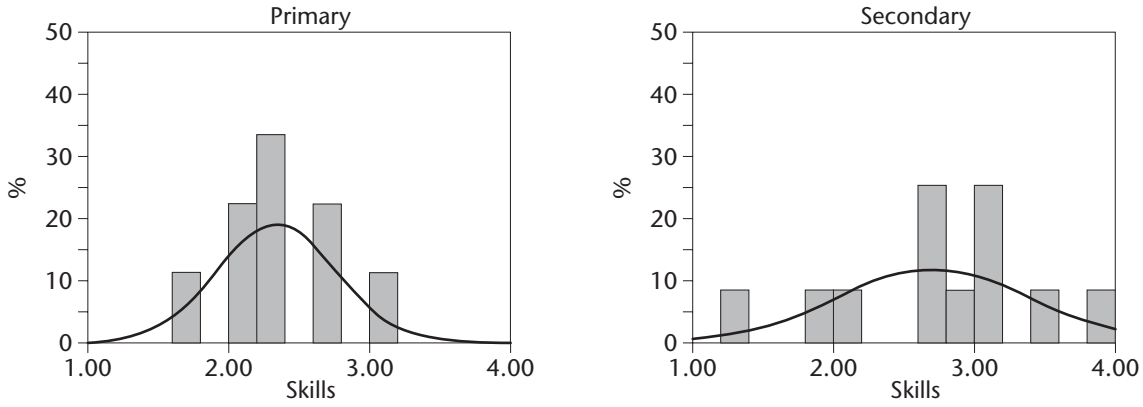


Figure 4. Frequency distribution for the teachers across the ICT SKILLS scale

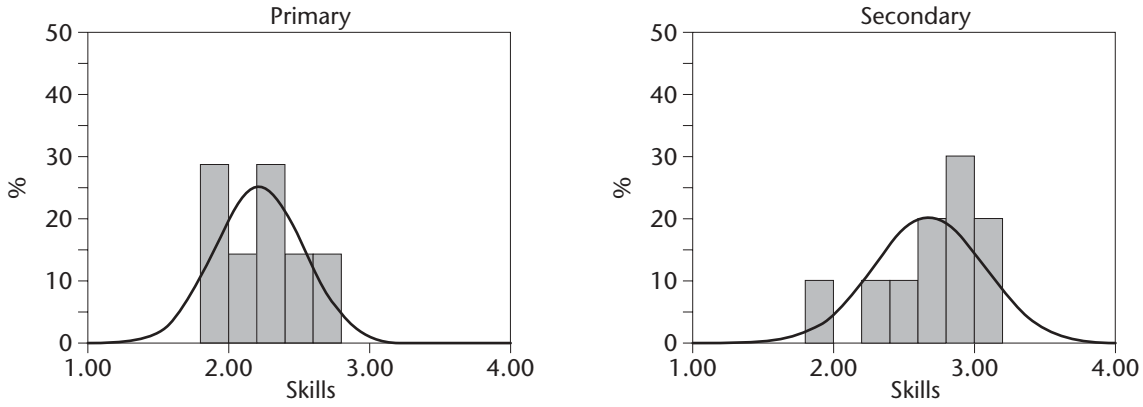


Figure 5. Frequency distribution for the pre-service teachers across the ICT SKILLS scale.

Item 2 asked teachers to indicate the extent to which they facilitated computer use for a range of different purposes. The pre-service teachers were asked the extent of their involvement with these purposes in terms of whether they had experienced them or seen them or not. Figures 6 and 7 summarise these data. Teachers indicated that the main purposes for students to use computers were to access and store information, type up assignments, present information, and to a lesser extent, develop a skill or concept. The only purposes for which there was little use of computers was for the purposes of analysing information, providing a problem, making a product, or simulating an environment or action.

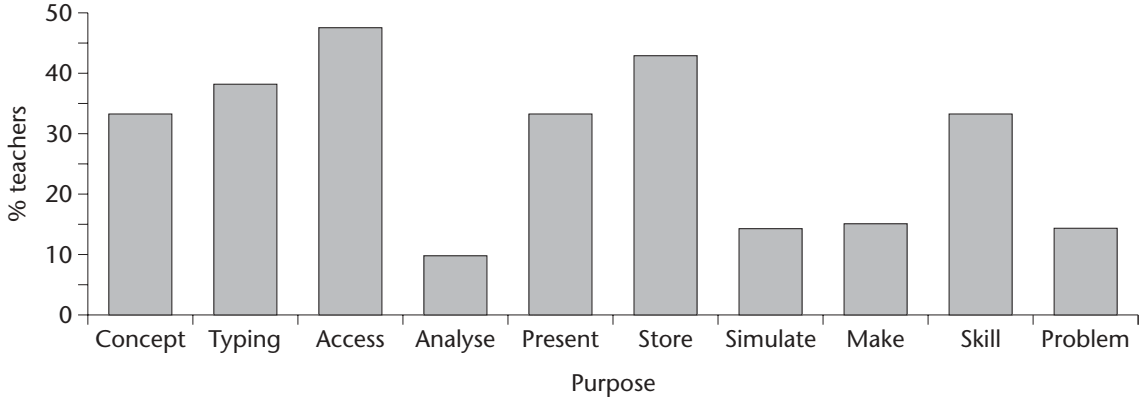


Figure 6. Proportion of teachers indicating significant activity in facilitating the use of computers to support particular task purposes

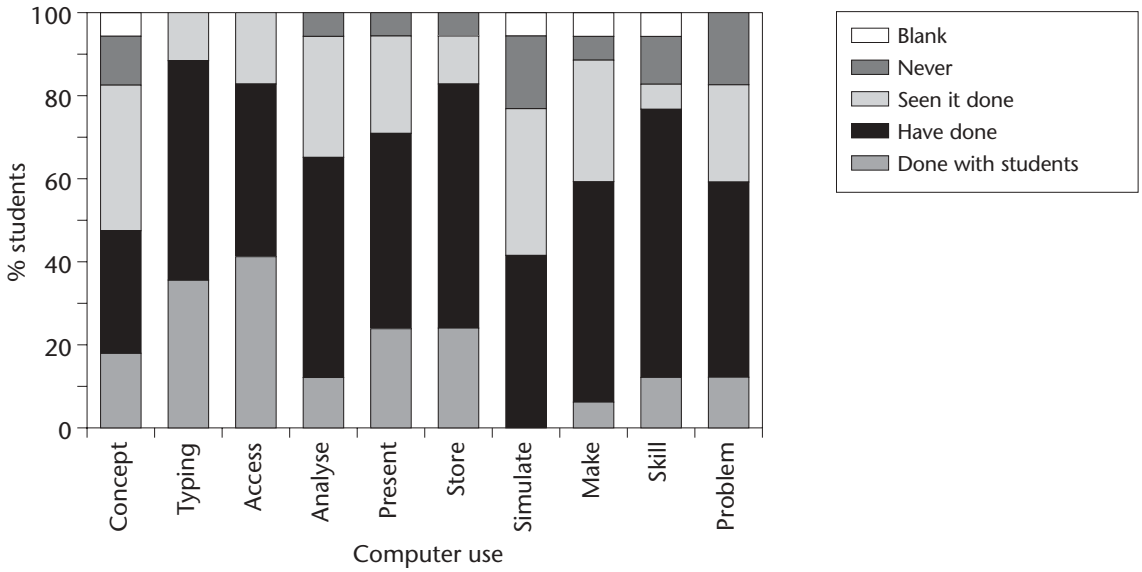


Figure 7. Proportion of pre-service teachers (student) indicating significant activity in facilitating the use of computers to support particular task purposes

The *Apply* scale was constructed from this item. A summary of the results is shown in Figure 8. The mid-point value for the scale is 2.5. On average these teachers were just above this value and therefore towards *Fortnightly* implementing of the applications. The secondary teachers were spread more across the scale and scored a little higher than the primary teachers.

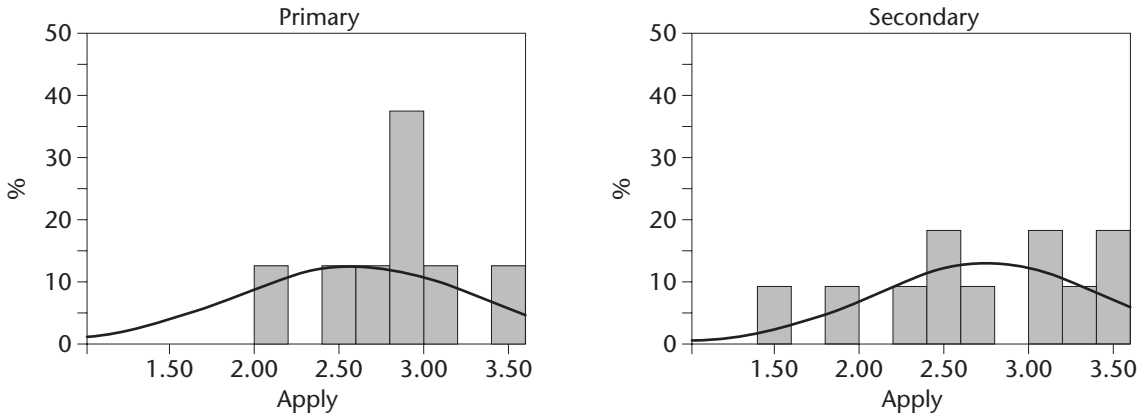


Figure 8. Frequency distribution for all teachers across the APPLY scale

On the similar scale constructed from the pre-service teacher survey (refer to Figure 9) it was clear that their level of experience with the range of applications was less than that for most of the teachers. The response types were different with a response of "Have Done it Myself" coded with 3 and "Have Seen it Done" coded with 2. Across the applications pre-service teachers tended towards the latter.

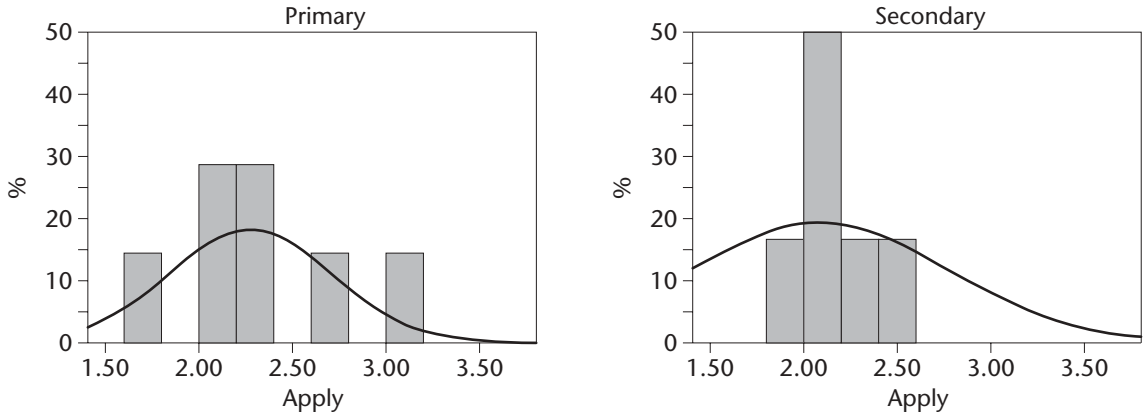


Figure 9. Frequency distribution for the pre-service teachers across the APPLY scale.

Item 3 of the questionnaire was based on the Christensen (1997) scale (C scale) which is a measure of confidence with ICT in teaching. The teacher was asked to select a global description which best fits their present situation. A summary of the responses is provided in Table 2. It was clear that there was a sense of confidence and comfort in the facilitation of applications of computers to support learning, with 90% at least indicating they were gaining this and starting to feel comfortable. Not surprisingly, the pre-service teachers tended to be less confident than the teachers, and the primary pre-service teachers were the least confident when compared with the secondary pre-service teachers.

Table 2. A summary of frequency of responses to Item 14 of the teacher questionnaire for all teachers and for the baseline data collection for the school and for the sample of Phase Two schools.

Description	%	%
Select the description of the following that best fits your present situation	Teachers	Pre-service teachers
I am aware that information technology can be used to support student learning but have not used it.	9.5	0.0
I am beginning to understand the process of using computers and can think of tasks in which it might be useful. I am trying to learn the basics but am often frustrated.	9.5	17.6
I am gaining a sense of confidence in using the computer for specific tasks. I am starting to feel comfortable using the computer.	28.6	47.1
I am not concerned about computer technology. I can use it in many applications and am able to facilitate its use as a learning tool and integrate it into the curriculum.	52.4	35.3

Teacher interviews

Teachers were interviewed at the conclusion of the project. The primary and secondary teachers were asked the same questions. All teachers responded to the questions either by e-mail or in face-to-face interviews.

The teachers at the primary school were interviewed on a one-to-one-basis. Interviews were of approximately 20 minutes duration. They were also asked to complete other questions which were e-mailed to them. The majority of the secondary teachers opted to complete the questionnaire by e-mail. This was mainly due to time constraints at the end of the year. Two teachers were interviewed face-to-face. The results were collated in a format which allowed the primary and secondary results to be compared.

The teachers generally believed that the project was a strong motivator in their taking on ICT professional development and implementing it within their classrooms. Many comments referred to the new skills that they'd learnt. They found the professional development day valuable, particularly in learning what programs were available and how they could be used in the classroom. Some teachers commented that they would have liked more time with the academic staff to further explore this area. There was also agreement that there should be more time between the professional development and the implementation of the project. This would allow for development of a program as well as having time with the pre-service teacher to plan in greater detail.

Some of the factors that impacted on the success of the project included:

- Timing of the year/time constraints.
- Many administrative interruptions (e.g., reports, swimming classes) towards the end of the year. It was suggested that the project be conducted during the Assistant Teacher Program of 10 weeks duration.
- ICT issues within the schools.
- The primary school operated under a system of having three trolleys of 12 laptops. This caused some logistical problems such as having enough computers per class, set up and pack away time, and ability to be able to log on.
- Initial problems with networks at the secondary school.

Some teachers expressed concern that the pre-service teachers were not prepared to experiment a great deal during the project because they were also being assessed in their practicum. It was felt that the project would benefit if pre-service teachers could participate in the project outside their practicum.

- Pre-service teachers need to have strong ICT skills.
- Concern was expressed, mainly in the secondary school, that the pre-service teachers did not have the ICT skills to take a strong leadership role in the project. This did not appear to be the case in the primary school.

Pre-service teacher interviews

The primary pre-service teachers were interviewed as a group towards the end of their practicum. In addition they completed a series of questions via e-mail. Generally the pre-service teachers appreciated the opportunity to implement an ICT program within a real situation. This allowed them to learn more classroom management strategies as well as develop a stronger understanding as to how motivating the use of technology is for students of any age. The pre-service teachers appreciated the opportunity to work collaboratively with the mentor teachers to develop a project from scratch. They felt they had more ownership over what was to be introduced in the classroom rather than being told what to implement. There was a strong appreciation of the opportunity to share ideas with the mentor teachers and other pre-service teachers.

The secondary pre-service teachers in particular, recommended that this type of project not be included as part of their practicum requirements. This may be due to the fact that they were Graduate Diploma pre-service teachers and needed to focus on other issues during this time.

Planning documents

A planning document was developed by Dr Paul Newhouse to assist teachers and pre-service teachers with the planning and evaluation processes involved in the project. Teachers were encouraged to complete the planning document as credit towards one module of the Edith Cowan University unit *Professional Learning 1*. Teachers were required to submit:

- A completed copy of the CSLE worksheet planning document.
- Copies of any other materials used in the implementation of the project with the class, to assist the assessor in determining the quality of implementation.
- A short reflective journal over the period of the project, describing the processes used from the conception of the idea to the implementation and evaluation. Information about the data collected as part of the evaluation was also requested.

Following is a summary of the planned outcomes submitted by the teachers and how they had planned to evaluate the outcomes.

Primary school

Description of the learning episode

- Year 1: Used PowerPoint to produce a short narrative booklet based on First Steps format.
- Year 2: Used PowerPoint to produce a talking storybook representing the life cycle of an animal. These were presented to a pre-primary class by the Year 2 students.
- Year 2/3: Used technology to produce an electronic portfolio in order to share a learning journey with parents and extended family.
- Year 3: Used word processing and e-mail to produce a recount that was shared with Year One buddy class. Photos imported from digital camera were attached to the e-mail.
- Year 7: Used a variety of multimedia applications to produce a Leaver's CD.

Evaluation of learning episode

- Year 1: Through effectiveness of the PowerPoint presentation: an ability to engage the audience; self evaluation: teacher evaluation as to whether the assessment criteria have been achieved.
- Year 2: Through the presentation of the talking book: speaking and listening in recording their story; self assessment in co-operative learning.
- Year 2/3: Through self reflection on using the e-mail system. Parents to provide an e-mail response.
- Year 3: Through development and sending a written e-mail containing attachments which should be able to be opened and read successfully by the recipients. Use of Writing strand (English) for assessment.

Senior high school

Description of the learning episode

- Year 9 Home Economics: Design an advertisement to promote a healthier meal, specifically addressing the fat content.
- Year 9 Science: Students to complete a research project and then present this through PowerPoint. Using the school intranet site to house the scaffolds, students are to work through Planning, Experimenting, Data analysis and Evaluation. Students then use ICT to make a presentation of their project. The use of a digital camera by students to record the events was expected.
- Year 10 LOTE: Improved reading and comprehension of Hangu (Chinese Mandarin) through use of Chinese Market software.
- Year 10 Science: Development of online tasks through *Hot Potatoes* that students can complete independently and receive immediate feedback.

Evaluation of learning episode

- Year 9 Home Economics: Presentation of an oral report and an advertisement; peer assessment and self evaluation.
- Year 9 Science: Students to be levelled in the Science Outcome — Investigating Scientifically.
- Year 10 LOTE: Comprehension test at the end of term.
- Year 10 Science: Survey the students.

Anecdotal data

Professional learning sessions with secondary teachers increased their awareness of the potential of ICT to support learning and the resources available, particularly in their own school. Teachers commented that the sustained time together away from the school provided them with this opportunity. In a number of cases ECU pre-service teachers and/or academics were involved in this process.

Discussion and implications

The model was successfully implemented in the two schools but this was limited to a single trial. The School of Education at ECU is committed to further developing this type of relationship with schools and CSaLT wants to include more schools for more extended periods within the program.

In relation to the research questions for this project the results have shown the following:

1. A strong relationship with a university is likely to assist a school in developing consistently good practice in the use of ICT in its curriculum.
2. Pre-service teachers and their lecturers can support school-based action-learning projects as an integral part of a professional practice experience.
3. Professional partnerships between universities and schools that involve pre-service teacher practicum experience, in-service professional learning and research promote the development of knowledge and skills for both teachers and pre-service teachers.
4. The quality of professional conversations in schools about ICT in learning improves as a result of the contributions by university staff and pre-service teachers to school's communities.

The only group that did not benefit significantly from this project were the non-instructor academics, only one of whom was called on by any of the teachers or pre-service teachers.

The main issues raised by the project were:

- The difficulty in providing adequate incentives to involve pre-service teachers in such activities.
- The value in a substantial group of teachers from a school participating in school-based professional learning.
- The difficulty in providing teachers with time to investigate, plan, evaluate and reflect on practice.
- The difficulty in involving academics in such activities in a meaningful way.
- The generally introductory level of ICT-related activities with which most teachers are currently involved.

Innovation and evidence of success

It is clear that involving a substantial number of teachers from one school for a significant amount of time, away from their school, is beneficial in developing understandings and collegiality. In particular, the secondary teachers made links between learning areas.

The limited nature of the trial means it is difficult to claim that the project led to curriculum and pedagogical change for the teachers, let alone in the schools as a whole. However, there was evidence that it provided the impetus to further promote changes in either curriculum or pedagogy. Almost all of the teachers, particularly the secondary teachers, indicated that they had been exposed to new ideas and have had the opportunity to explore the possibilities of these.

The applications teachers selected to explore varied greatly, with many being relatively unsophisticated and not new by international standards. Notwithstanding this, for these teachers this was at least a step forward. There were a few teachers, particularly in the secondary school, who attempted more sophisticated applications involving the use of online or audio-visual creative technologies. The project encouraged them to experiment or pursue technologies of which they had become aware.

Partnerships

Constructing partnerships with schools helped the project overcome two difficulties: involving a critical mass of teachers from a school and organising professional learning that must take place within school time. The real costs in supporting these were considerable, but the existing partnership arrangements helped greatly to mitigate the costs.

Involvement in the project has strengthened the partnerships with the two schools. Further, there has been an increase in awareness of ICT among teachers and an increase in collegiality and cross-discipline activity.

Future of pre-service education and professional learning for teachers

It has been difficult to involve pre-service teachers in a project such as this — had there been an assessment associated with the project, their participation might have been much more enthusiastic. Several even indicated a preference for professional practice in a "normal" school — one in which they would not be involved in using computers at all! All pre-service teachers will only be involved in activities such as these when supporting their students' use of computers is a compulsory component of their certification requirements.

Management of partnerships and projects

The project has identified the necessity of school-based professional learning and also the cost of such practices. On average the project cost $1000 per teacher. This would have been greater had existing partnerships and academic structures not been available. If this approach to professional learning is located within broader partnerships, then the management overheads will be reduced. Economies of scale could be achieved by involving many more schools in which there were sufficient teachers willing to participate.

Conclusions and recommendations

Several conclusions and recommendations that need to be addressed at national, state or local school level can be elicited from this project. The main conclusions arising from the study were:

1. The partnership model implemented in the project using action-learning and action-research paradigms was successful for many of the teachers and pre-service teachers but not for the academics.
2. Involving a substantial group of teachers from a school in a school-based professional-learning program enhances the outcomes, particularly with regard to the quality of professional conversations. This is also an advantage for pre-service teachers.
3. Lack of time for investigation, reflection and planning continue to be a major constraint on the involvement of teachers. Paid teacher relief is necessary. The project needed to include more support for evaluation and reflection. Teachers need considerable incentives to become fully involved.
4. The perception by pre-service teachers that experience and expertise in facilitating computer use by students is an unnecessary component of both teaching and accreditation for teaching is the main constraint on their involvement.
5. When partnerships between teachers and pre-service teachers work on new applications of ICT to teaching and learning, teachers are likely to feel more confident/comfortable undertaking such initiatives if they have pre-service teachers with ICT skills.

Recommendations arising from these conclusions are as follows:

1. Teacher accreditation needs to include a reasonable level of expertise and experience both in using ICT and facilitating ICT use by students to support learning.
2. The relationship between ICT competencies in teacher accreditation and in pre-service teacher education needs to be clarified.
3. Evaluation and review of teacher education programs should include a variety of experiences with educational technology.
4. School-based research should be disseminated in schools through professional learning programs.
5. Teacher education courses need to be resourced as a science, not as humanities courses.
6. Sustainable and effective strategies for in-service teacher professional learning for the integration of ICT in schools need encouragement and support.

Acknowledgements

As CSaLT Director and Project Leader, I, Paul Newhouse, would like to thank the following people and acknowledge their willingness to take on roles contributing to the success of the project.

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References

Becker, H.J., Ravitz, J.L. & Wong, Y.T. (1999). *Teacher and Teacher-Directed Student Use of Computers and Software*. (Teaching, Learning, and Computing: 1998 National Survey. No. 3). Irvine, California: Center for Research on Information Technology and Organisations, University of California, Irvine.

DEST. (2001). *Making better connections: Models of teacher professional development for the integration of ICT into classroom practice*. Canberra: Department of Education, Science and Training.

DEST. (2002). *Raising the standards: A proposal for the development of an ICT competency framework for teachers*. Canberra: Department of Education, Science and Training.

Newhouse, C.P., Trinidad, S. & B.C. (2002). *A Teacher Professional ICT Attributes Framework — Outcomes, Guidelines, Equipment and Processes*. Perth: Western Australian Department of Education.

Newmann, F.M. & Weylage, G.G. (1995). *Successful school restructuring: A report to the public and educators*. Madison, Wisconsin: Center on Organisation and Restructuring Schools, Wisconsin Center for Education Research, University of Wisonsin.

Developing online collaborative learning communities

REPORT FROM THE SOUTH AUSTRALIA PROJECT

Bruce White, University of South Australia, Mawson Lakes Campus
Dean Clark, South Australian Department of Education and Children's Services
Ruth Geer, University of South Australia, Mawson Lakes Campus

Executive summary

In 2005 South Australian government schools and preschools were provided with new Internet services to replace the services previously provided under the sa.edu contract. The new services included improved Internet speed, new tools for managing and building web sites (EdSuite), audio and multimedia conferencing, and streaming television capability. The implementation of these services is referred to as the eduCONNECT Project.

The PICTL project was seen as an innovative strategy for providing training resources for the EdSuite tools at the school level, by focusing on the educational potential of the portal and within a local context.

This project was designed to build and use a collaborative learning space within the online environment provided by the eduCONNECT project. As the environment had only recently been implemented in schools, this provided the project team with a unique opportunity to examine appropriate online pedagogies and co-construct learning materials appropriate for schools using pre-service teachers, teachers, university lecturers and staff from the Technology School of the Future.

Resources from the PICTL project would also be developed for use in the eduCONNECT Materials project, instigated in 2006, to expand the training provided by the Technology School of the Future (TSOF) through the development of a range of multimedia modules and an online training strategy for the EdSuite tools.

The collaborative environment allowed pre-service teachers to move between the university and school settings and work with both school and university staff. Pre-service teachers would be exploring the eduCONNECT system's capacity to host a professional space before collaborating with teachers and university staff to develop curriculum activities for students in schools. The activities were then delivered by the pre-service teachers as part of their practicum. An action learning model was used to reflect on the capacity of online environments to support higher order thinking and substantive communication in curriculum contexts.

Project goals were:

1. For all the learners to assess the professional, curriculum and pedagogical value of the eduCONNECT environment.
2. To use new curriculum and pedagogical reforms for professional-learning experiences designed to develop curriculum.
3. To support schools in improving the quality of ICT in learning applications.
4. To develop resources that can be used in the wider education community for supporting online learning.
5. To develop a sustainable community of practice that stimulates further activity and willingness to support pre-service teachers.

The pre-service teacher, in conjunction with the teacher and the TSoF staff member, developed an EdTeam and an *EdWeb* website which were used during their practicum placement at the school. The teachers assisted with the subject content and the pre-service teachers used the knowledge gained through the workshops to develop their online unit of work. The TSoF person was used as a mentor to support the use of the online environment.

There were some limitations to the environment which made some of the intended interactions more difficult. All participants had to be enrolled with eduCONNECT at the school in which the unit was to be delivered. Nevertheless, the pre-service teachers were given the opportunity to test out the environment more fully. Similarly, the TSoF staff had the opportunity to see what the environment was capable of doing. An action-learning model enabled the participants to reflect on their work and host professional conversations.

The pre-service teachers' responses indicated that the project had been a most productive learning experience for them. This was confirmed by the mentor teachers who indicated that the pre-service teachers had been highly motivated and had been very successful in the implementation of the online unit. The mentor teachers also commented very favourably on their own learning and the collaboration that had occurred.

The teachers' level of engagement with the material development meant that, as well as learning how to use the environment to construct materials, discussions with the pre-service teachers developed their pedagogical approach to the use of the environment. Because of their use in the development process there is an increased likelihood of the materials being used again.

It was evident from both the materials developed for this project and the comments from all of the participants that the development process used had been successful. There was evidence of collaboration between the teachers and the pre-service teachers in the development of the materials. It was also evident that they had made significant progress in their understanding of how to use the environment for teaching.

Purpose of the project

This project arose from the recent Department of Education, Science and Training (DEST) report *Making better connections* (DEST, 2001). The report indicated that there had been limited research in the area of online collaborative tools, their use in schools for instruction and as a means of facilitating a team-learning approach. The report highlighted the complexity of professional development of teachers, the pre-service education of teachers in the area of Information and Communication Technology (ICT) and its use in schools. It recommended that new approaches should be trialled that engaged teachers, pre-service teachers and university staff. The South Australian project was one such trial conducted as part of a national project. At a local level, it examined ways that pre-service teachers could engage with a school's online environment prior to their placement at the school. This allowed them to become familiar with the school online environment and to interact with the teachers and possibly other pre-service teachers prior to their actual placement. The schools were metropolitan but the project outcomes also have implications for country schools.

Developing online collaborative learning communities

This project was designed to build and use a collaborative learning space within the online environment provided by the eduCONNECT project. The environment had only recently been implemented in schools. This provided the project team with a unique opportunity to examine appropriate online pedagogies and co-construct learning materials appropriate for schools using pre-service teachers, teachers, university lecturers and staff from the Technology School of the Future.

The collaborative environment allowed pre-service teachers to move between the university and the school settings and work with both school and university staff. Pre-service teachers would explore the eduCONNECT system's capacity to host a professional space before collaborating with teachers and university staff to develop curriculum activities for students in schools. The activities were then delivered by the pre-service teachers as part of their practicum. An action learning model was used to reflect on the capacity of online environments to support higher order thinking and substantive communication in curriculum contexts.

The goals of the project were as follows:

1. For all the learners to assess the professional, curriculum and pedagogical value of the eduCONNECT environment.
2. To use new curriculum and pedagogical reforms for professional learning experiences designed to develop curriculum.
3. To support schools in improving the quality of ICT in learning applications.
4. To develop resources that can be used in the wider education community for supporting online learning.
5. To develop a sustainable community of practice that stimulates further activity and willingness to support pre-service teachers.

Research questions were:

1. How effective is the online learning environment in facilitating learning involving schools, the university and pre-service teachers?
2. Does the online collaborative learning environment allow for the transition of student teachers from university to a school?
3. How effective is the online pedagogical approach in facilitating pre-service teacher learning and as a professional development tool for teachers?

Context

In 2005 South Australian government schools and preschools were provided with new Internet services to replace those previously provided under the sa.edu contract. The new services included improved Internet speed, new tools for managing and building web sites, audio and multimedia conferencing, and streaming television capability. The implementation of these services is referred to as the eduCONNECT Project.

As part of the introduction process, CSM Technology (the provider of the EdSuite tools) presented an EdSuite professional development program made up of 10 days, consisting of two hands-on sessions each day (one in the morning and one in the afternoon). Teachers were able to attend these sessions free of charge. Eighty-eight teachers attended these sessions.

The Technology School of the Future followed this program in developing a series of courses that culminated in the Effective Learning with eduCONNECT: Administrator course. In 2005, 158 people participated in this course.

A review of the Department of Education & Children's Services (DECS) call statistics for users, reported by the DECS Customer Support Centre for the six months prior to the PICTL project, indicated there was still a requirement for training to be made available to schools and preschools to support their use of the *Ed Applications*.

The PICTL project was seen as an innovative strategy for providing training resources for the EdSuite tools at the school level, by focusing on the educational potential of the portal and within a local context.

Resources from the PICTL project would also be developed for use in the eduCONNECT Materials project. This was instigated in 2006 to expand the training provided by the Technology School of the Future (TSOF) through the development of a range of multimedia modules and an online training strategy for the EdSuite tools.

Partnership

For purposes of this project, partnership was defined as:

> Regular and sustained exchange of people, ideas and projects. People build relationships in the partnership through exchanges and use the synergy of the relationships and activities to initiate further ongoing and sustained activity.

The partnership has been a means of supporting pre-service teachers' learning and also a means of teacher and the University of South Australia staff professional learning. The partnership between DECS (through TSOF) and university has continually evolved. The connection has developed and extended as a result of the success of the project. For example, 2006 saw the partnership further develop with the incorporation of the Magill campus and the staff associated with the junior primary/primary programs becoming involved. The partnership between the schools involved in the first pilot studies and the university has also been strengthened, and is developing further this year through a continuation of the ICT project and other school-based projects in which pre-service teachers have become involved.

This project has a four-way connection in which an expert in the Edsuite tools from TSoF has provided initial guidance and training. This has meant that the teachers have also been exposed to the new environments. This extra dimension has enabled the pre-service teachers to have a wider-than-school experience while maintaining a specific target and mentor. The short timeline has made it a little difficult to develop the partnership fully but the ongoing relationships throughout 2006 are encouraging the partnerships to mature. The partnership between the university, TSoF and the schools has been an essential element in the success of the project. It has been expanded to include the junior primary/primary program in 2006 and this will be extended across all programs as time permits.

Project design

During the design of the project it was recognised that the pre-service teachers needed to have a wider understanding of what it meant to provide an online unit of work. Hence, discussions around the learning objectives for their unit of work, and processes to achieve these were considered in a variety of online contexts.

This project was designed to build and use a collaborative learning space within the online environment provided by the eduCONNECT project. The environment had only recently been implemented in schools, providing the project team with a unique opportunity to examine appropriate online pedagogies and co-construct learning materials appropriate for schools, using pre-service teachers, teachers, university lecturers and staff from the Technology School of the Future.

The collaborative environment allowed pre-service teachers to move between the university and the school settings and work with both school and university staff. Pre-service teachers would be exploring the eduCONNECT system's capacity to host a virtual professional space before collaborating with teachers and university staff to develop quality curriculum activities for students in schools. The activities were then delivered by the pre-service teachers as part of their practicum. An action-learning model was used to reflect on the capacity of online environments to support higher order thinking and substantive communication in curriculum contexts.

> Online learning environments come in all shapes and sizes. In addition to features, simplicity and user-friendly access are the most important attributes to consider. The goal of technology should be to serve the community through its precision. Community members should spend more time learning about the topic than about how to use a given technology. In addition, technology should be transparent to the instructor as well as the learner; no technical knowledge should be required to customise or manage the environment. (Kaplan, 2002)

There were some limitations to the environment. For example, all participants had to be enrolled with eduCONNECT at the school in which the unit was to be delivered. This made some of the intended interactions more difficult. Nevertheless, it did allow the pre-service teachers an opportunity to test the environment more fully. It also provided the TSoF staff the opportunity to see what the environment was capable of doing. An action-learning model enabled the participants to reflect on their work and to host professional conversations.

Data collection and analysis

The qualitative approach was chosen as appropriate for this study. A qualitative study gives a more "holistic" impression of teaching (Frankel & Wallen, 1996) focusing on the "whole picture" rather than breaking it down into variables (Neuman, 2000). The approach enabled the researchers to investigate teachers' and pre-service teachers' perceptions and experiences of online collaboration and classroom use of online materials. The researchers hoped to gain insight into the participants' engagement and to gather data through structured interviews (Neuman, 2000). The structured interviews were conducted one-on-one with the participants that volunteered to contribute to the research. Interviews allowed participants the opportunity to expand on the questions and to discuss the strategies they used when integrating online materials into their classroom, as well as to describe personal learning which took place. This method of research was designed to describe and interpret the experiences of the pre-service teachers and the teachers in some detail.

The key indicators of success for the project were to be:

1. All participants engaging in the online environment.
2. The successful implementation by pre-service teachers of ICT rich materials that use the eduCONNECT environment.
3. Data gathered on the use of the online environment by the participants. (The EdSuite tools have in-built data collection records which provide significant materials on the work being undertaken in the online environment.)

The teachers and the pre-service teachers were interviewed using a structured approach. Interviews were taped and transcribed. Common themes were drawn from this data. These interviews were designed to elicit the participants' perceptions of what they thought the strengths and weaknesses of this approach were ways in which it could be improved, the strengths and weaknesses of this teaching approach, and their perceptions of the *EdWeb* environment.

The materials developed were also examined by the TSoF representative and the university lecturer to assess the extent to which these had incorporated the ideas expressed in the workshops attended by the pre-service teachers.

Results

Online engagement

The in-built data collection tools were used to determine the extent to which the environment was used by the students. The data presented in Tables 1, 2 and 3 are from the pilot project conducted in 2005.

Table 1. Hits by user report

User	Number of hits
TSoF representative	32
School ICT Coordinator	9
Host School teacher	122
Pre-service teacher 1	314
Pre-service teacher 2	198
Students	749
Total	1424

Table 2. Hits by user by team area report

User	Announce-ments	Things to share	Discussion board	Digital drop box	My notes	Tasks
TSoF representative	7	5	17			3
School ICT Coordinator	6	3				
Host School teacher	50	61	11			
Pre-service teacher 1	109	65	136		1	3
Pre-service teacher 2	53	45	91	3	4	2
Students	145	381	437	4	8	17
Total	370	560	692	7	13	25

Table 3. Hits by day of the week report

Day of the week	Number of hits
Monday	164
Tuesday	48
Wednesday	37
Thursday	172
Friday	839
Saturday	20
Sunday	144
Total	1424

All participants in the project were engaged regularly in the online environment. In fact, the site at which the unit of work was hosted was the 22nd most popular URL, by hits, for the school site. The data collected from the reports closely reflected the model of Berge and Collins (1996) as to the changing roles of teachers and students operating in online environments (Figure 1).

Instructor role:	
Face to face	Online
from lecturer	to guide and resource provider
from provider of answers	to expert questioner
from provider of content	to designer of student learning experiences
from total control of the teaching environment	to sharing with the student as a fellow learner
from teacher-directed to	to learner-centred
Source: Berge & Collins, 1996	

Learner role:	
Face to face	Online
from passive receptacles	to constructors of their own knowledge
from memorisers of facts	to problem solvers
from passive learning	to active learning
Source: Berge & Collins, 1996	

Figure 1. Changing roles of teachers and students

The success of the unit and the use of the online environment were supported by the student comments which indicated that there were a number of positive aspects to working online:

- It's easier / quicker
- It's something different from what we usually do
- It lets me transfer information easily. "I don't have to write stuff twice"
- You don't lose anything
- I see my work and do it whenever I want to
- I can work with a group on some tasks
- It's easier to make my work look good. "It doesn't matter that my handwriting is bad and I can't draw well"
- I can do other things online while I am getting my work done at the same time.

All of the teachers and pre-service teachers interviewed commented on the increased engagement of the students working in the online environment. A further indicator of the success of the unit of work is demonstrated by the teachers (see Table 4) continuing the work independently with a similar format in 2006.

Table 4. 2006 hits by user report

User	Number of hits
School ICT Coordinator	12
Host School Coordinator	391
Students	210
Guests	4
Total	617

Evaluation of the process used

The pre-service teachers' responses indicated that the project had been an extremely positive learning experience for them. This was supported by the mentor teacher who indicated that the pre-service teachers had been highly motivated and had been very successful in the implementation of the online unit. The mentor teacher also commented very positively on her own learning and the collaboration that had occurred.

The interview data indicated that all of the participants were very enthusiastic about the approach used. The collaborative nature of the project was identified as a strength. For example, between the teachers and the pre-service teachers:

> The process was basically based on conversations that Bethany and myself had — just brainstorming ideas and again with Carolyn (our mentor), getting ideas from her and feedback from what we had been discussing as well.

and between the TSoF person and the pre-service teachers:

> We always felt supported in terms of getting specific ways of using it, no one really knew, but in terms of the support network. It was new to everyone basically — sometimes some questions would get answered but Dean would always try and find an answer for you — definitely the support and the team work was great — there were partnerships there.

The teachers' level of engagement meant that as well as learning how to use the environment to construct materials, discussions with the pre-service teachers developed the pedagogical approach to the use of the environment.

As the EdSuite tools were managed at the school level, all team members had to be enrolled and log in to the eduCONNECT environment at the host schools. E-mail therefore became the easiest form of online collaboration, with the pre-service teachers contributing the content.

The importance of this project as part of their normal course workload was highlighted by the pre-service teachers. They all agreed that if it were not part of their university workload they probably would have still been willing to be part of the project, but they would not have had the time to devote to it. The pre-service teachers were of the opinion that semesters with a practicum placement were very busy and to add more would place them under too much pressure. Having this as a requirement of a separate course enabled them to allocate more time.

The project was conducted in two stages. In semester 2 2005, a pilot was run with two secondary schools and three pre-service teachers. One school's focus was on the *EdWeb* Environment; the other used *Moodle*. The second stage was run in the first semester 2006, and involved two secondary schools and three primary schools. The structure used was similar in both trials.

The pre-service teachers attended a series of workshops that were conducted by the staff at TSoF. Initially it was planned that the teachers would also attend the workshops but that proved to be impractical because of time constraints. Because the pre-service teachers had more flexible timetables it was decided that only they would attend the sessions. The workshops focused on: EdTeams, *EdWeb*, Centra leaders training, Online delivery methods for Maths/Science, Learning and Teaching with the Internet — Maths/Science and The Class Blog.

These sessions informed the pre-service teachers about the choices they could make when choosing the appropriate technologies to support their teaching.

Evaluation of the materials developed

The pre-service teachers, in conjunction with the teacher and the TSoF staff member, developed an EdTeam and an *EdWeb* website which were used during their practicum placement at the school. The teacher assisted with the subject content and the pre-service teachers used the knowledge gained through the workshops to develop their online unit of work. The TSoF person was used as a mentor to support the use of the online environment.

Two examples of the materials developed will be examined in more detail. While they should be viewed as examples, they are representative of the materials developed and implemented by the other groups.

The structure of two of the websites can be seen in Figure 2 and Figure 3. It can be seen that several activities were implemented.

The focus of the first website was a Year 10 electricity unit of work which was linked to a robotics project in which the pre-service teachers were involved at the same time. The basis for the second website was the South Australian Certificate of Education (SACE) 1 Chemistry. This is for second last year of high school and leads to SACE 2 Chemistry, which is taken in the final year of high school and may be used for university entrance.

The topic developed was Organic Chemistry. Both of the websites had an introductory page which gave a brief introduction and outlined the key features (Figures 4 and 5). This was to enable students to work as independently as possible. The first website was also linked to another project in which the students were involved (Figure 6). The main section of the second website was a shared area which contained materials covered in class for revision purposes (Figure 7). A Discussion Board (Figure 8) was one of the main forms of interaction implemented. The Pre-service teachers indicated however, that due to the short timeline, this was not used as extensively as hoped. An announcement section (Figure 9) was included in order to foster interaction among the students. By providing announcements electronically it was hoped that the students would visit the site more often. The data in Table 2 indicate that this appeared to succeed, as the students visited this section regularly. The solutions pages (Figure 10) were an attempt to incorporate more interactivity to the site. This was a novel approach and was well received by the students.

Figure 2. Website 1 overall structures

Figure 3. Website 2 overall structures

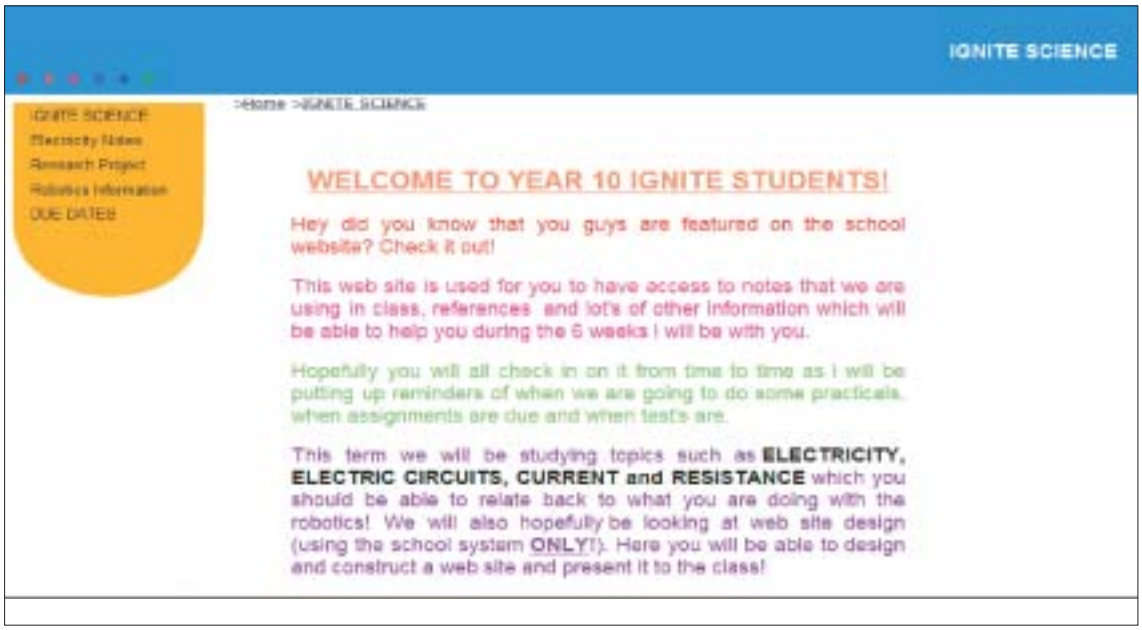

Figure 4. Introduction page of second website

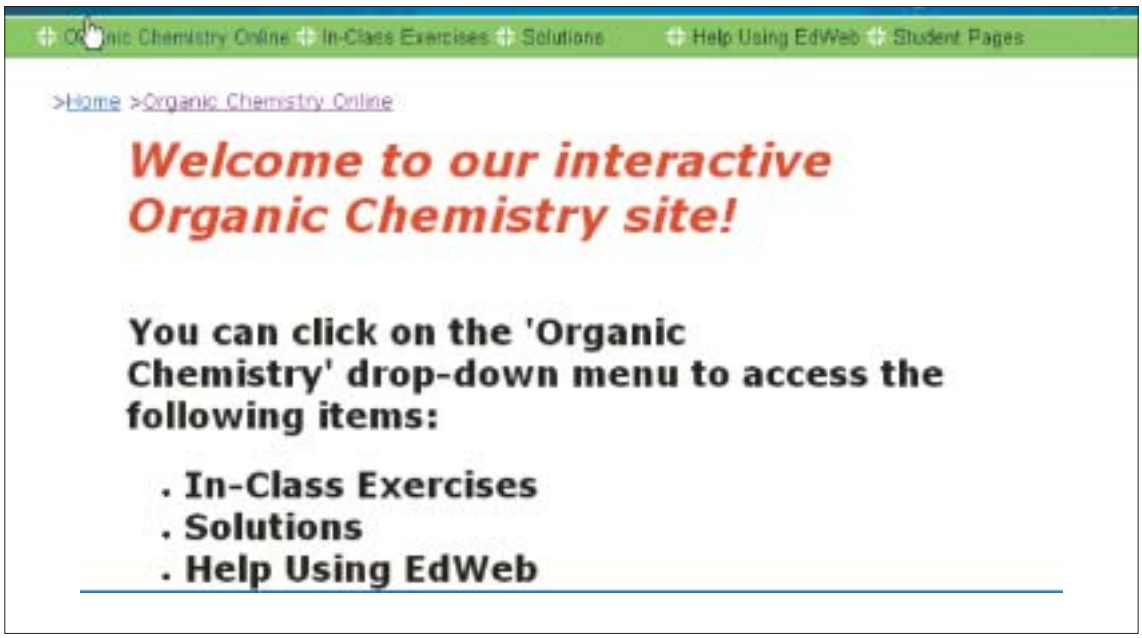

Figure 5. Introduction page of second website

Figure 6. Link to information on other projects class involved in.

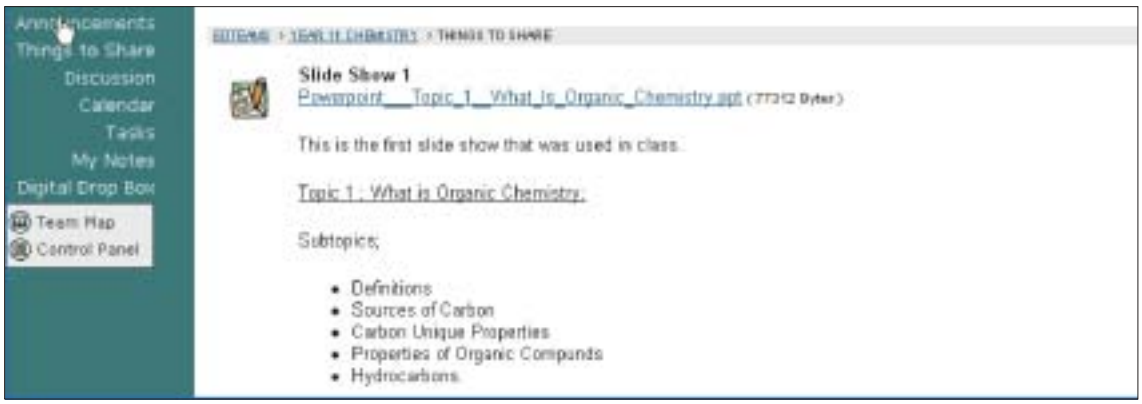

Figure 7. Shared area for website 2

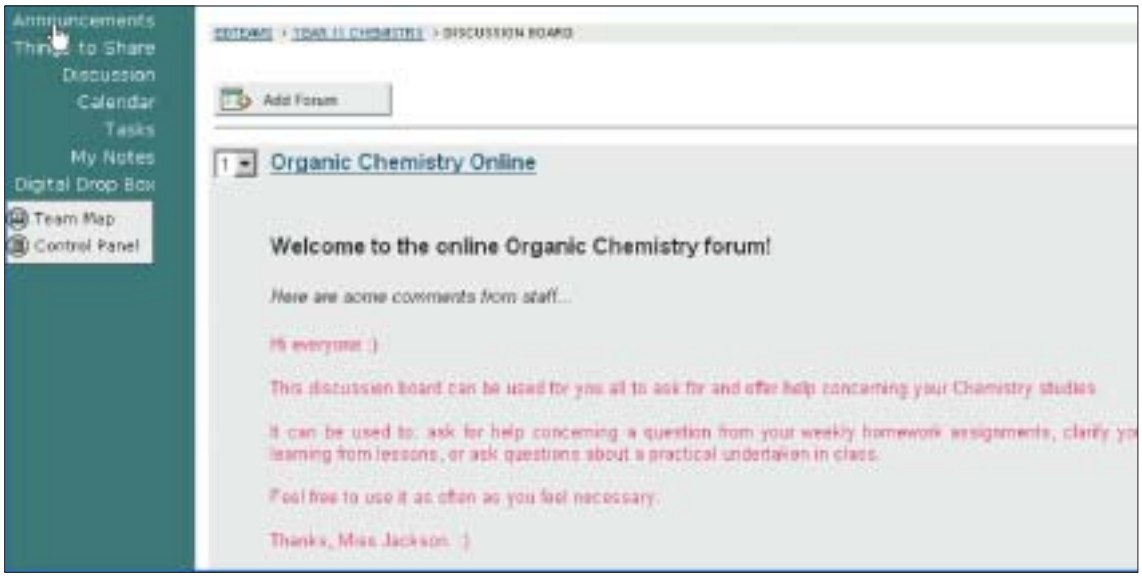

Figure 8. Discussion board for website 2

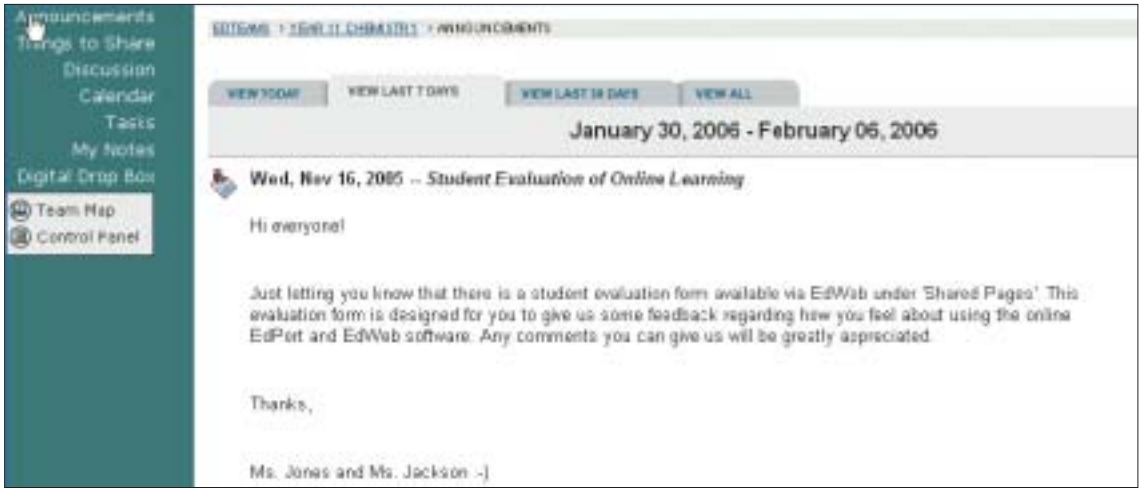

Figure 9. Announcement section website 2

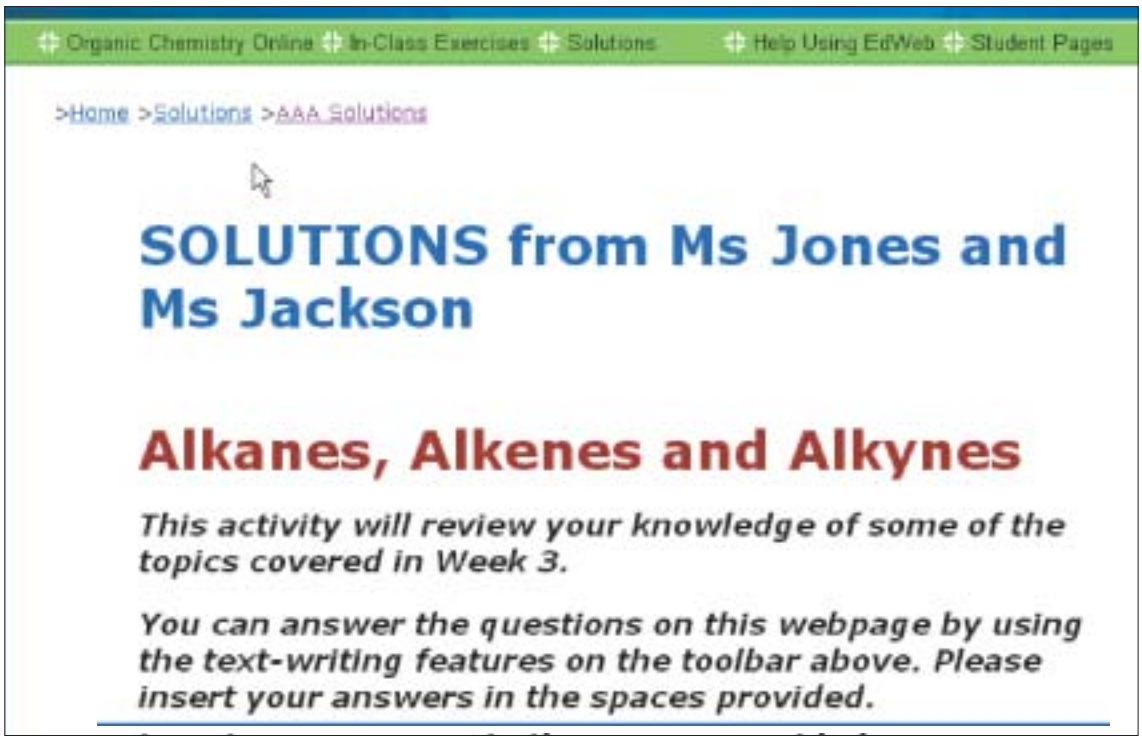

Figure 10. Solutions section website 2

Comments from the TSoF staff indicated that the materials that pre-service teachers developed incorporated many of the ideas from the workshops. The second website is being used as an example of what can be achieved in the environment and the teacher has continued to use and develop the materials. The online environment allowed for some interactions between the staff and students although there are areas that can be further developed.

Conclusions and recommendations

The key findings from the study may be summarised as follows:

- The nature of the project provided a specific focus and an end-product that made the task easier to achieve. The pre-service teachers were very enthusiastic about this approach and it is intended that this will be further developed within some Education programs.
- Since they collaborated in the development of the materials the teachers will find it easier to continue with their use.
- In one school two pre-service teachers worked together thus supporting each other as well as being assisted by the mentor teacher. When pre-service teachers were placed individually in schools the development process proved harder but the level of engagement with the teacher was maintained in most cases.
- The partnerships developed have been successful and are ongoing. They are valued by all.
- The TSoF participation has provided a significant link between the schools and the university. It has contributed noticeably to the success of the project.
- The use of pre-service teachers to work with teachers to introduce new technical skills has been most productive.
- The environment allowed for some student interaction and that was positively regarded by all involved. Further development of this aspect is being considered.
- The environment was very easy for beginners to use and allowed for the focus to be on pedagogy rather than technology. This is important for beginners in the online world.

In order for the pre-service teachers to be able to devote sufficient time to school-based projects these need to be part of their accredited study program. The projects cannot be regarded as something else to be added to the pre-service teachers' practicum. TSoF is considering accrediting these pre-service teachers so that they will maintain the accreditation should they become DECS employees. Projects need to be school-based and, where possible, school-initiated.

Although there are advantages when universities work directly with schools, access to TSoF is of greater value. The school link is much easier and the potential for more widespread outcomes is greater. Involvement of the TSoF staff in the initial workshop was of great value to the pre-service teachers and university staff alike.

References

Berge, Z.L. & Collins, M. (1996). *Computer Mediated Communication and The Online Classroom. Vol. 2: Higher Education*. Cresskill: Hampton Press, Inc.

Department of Education, Science and Training (DEST). (2001). *Making better connections*. [Online Accessed 11 October 2005] URL: http://www.dest.gov.au/NR/rdonlyres/3A88BB29-9798-49A1-90DB-0E46590E96BF/1593/MBC.pdf

Frankel, J. & Wallen, N. (1996). *How to Design and Evaluate Research in Education*. New York: McGraw Hill Inc.

Kaplan, S. (2002). *Building Communities — Strategies for Collaborative Learning*. Online Access (7 April 2006) http://www.learningcircuits.org/2002/aug2002/kaplan.html

Leach, J. & Moon, B. (2000). 'Pedagogy, Information and Communications Technology and Teachers' Professional Knowledge'. *The Curriculum Journal* (British Curriculum Foundation), vol. 11, no. 3, pp. 385–404.

Neuman, W. (2000). *Social Research Methods: Qualitative and Quantitative Approaches. 4th edition*. New York: Allyn and Bacon.

Pearson, J. (2003). Information and communications technologies and teacher education in Australia. *Technology, Pedagogy and Education*, vol. 12, no. 1, pp. 39–58.

Roblyer, M.D. (2003). *Integrating Educational Technology into Teaching. 3rd edition*. Upper Saddle River, NJ: Pearson Education, Inc./Merrill Prentice Hall.

Appendix

Question and dot points indicate areas that should be addressed

What are your perceptions of the effectiveness of the students' use of the materials that have been developed?

- Motivation
- Engagement
- Learning
- Access

What are your perceptions of the process used to develop the materials?

- Teachers
- Pre-service teachers
- Team approach
- Online collaboration

What use has been made of the online environment to develop materials?

- Strengths of the environment
- Barriers to its use
- Features that would have made the process easier

How effective was the online environment in allowing you to collaborate with other participants in the project?

- Strengths of the environment
- Barriers to its use
- Features that would have made the process easier

How would you describe what, if anything, you have learnt from being involved in the project?

- Skills
- Online pedagogical processes
- Online collaboration skills

Any other comments that you would like to make in regard to the project?

Integrating and embedding ICT into the work of schools and universities

REPORT FROM NORTHERN TERRITORY PROJECT

Mike Grenfell, Charles Darwin University

Executive summary

The Northern Territory project sought to explore ways to embed ICT practices into the work of the schools and the university through the development of e-portfolios using a freely-available learning platform. This involved an examination of some of the practical difficulties in creating online communities of learners, and the degree to which the use of online environments influenced the interpretation of the curriculum.

Pre-service teachers worked with mentor teachers during the practicum, which formed part of the Graduate Diploma of Secondary Education program. The work took place in a Darwin high school and in a rural secondary school some distance from Darwin. The numbers involved in the schools were small, although other pre-service teachers were attached to the project and undertook e-portfolio work elsewhere.

Outcomes were limited. Pre-service teachers did not get into the school until late in the project. The scope of the original project design had to be severely modified. The workshops held prior to the project were not as productive as expected and the group experienced problems in operating the learning platform adopted. Problems were experienced with the project management and collaboration between the university and the Northern Territory Department of Employment, Education and Training (NTDEET) partners was unproductive. Communication between the university and its school-based partners was ineffective, and the demands of the syllabus took precedence over the work of the project. Only in one instance was extensive work undertaken on e-portfolios.

In spite of this, pre-service teachers at the schools "blogged" intensively in most cases they explored the potential of the learning platform, compared the learning platform adopted with the learning landscapes offered by other platforms, and demonstrated what could be achieved using PowerPoint when compiling e-portfolios. However, it cannot be claimed that in such a short period, ICT became embedded in the work of the schools, nor has there been evidence at this stage of a flow-back into the way ICT is incorporated into the School of Education at Charles Darwin University (CDU).

The project has raised the following issues:

- The role of the project manager in such projects and how directive and interventionist he/she should be in view of the limited time which could be afforded the project.
- The continuing need to address the different cultures which exist in the Department of Education and CDU.
- The meaning of collaboration and how this can be provided for.
- The need to incorporate ICT more extensively in the current review of pre-service education courses within the School of Education and provide for annual audits.
- The discrepancies between the operating systems relied on by the Department and the university and the inadequate resourcing found in the schools.

- The best way to promote professional learning to ensure the uptake of ICT content knowledge and pedagogical knowledge.
- The need to refocus on the role of Communities of Learners.
- The need for Teaching Schools to incorporate a number of the features of professional development schools.

Purpose of the project

The project was designed to enhance the integration of ICT in schools and the university through the development of e-portfolios compiled by pre-service teachers, mentor teachers, university staff from the School of Education and NTDEET staff working collaboratively as a community of learners. The participants were considered to be co-learners investigating the potential of online environments to meet new curriculum and pedagogical demands. Mentor teachers and pre-service teachers would be engaged in designing online-curriculum experiences for school students to illustrate the depth of synergy of their professional learning. This involved a consideration of the types of e-portfolio suited to the needs of the individual participants as explained in Appendix 1.

The project sought to involve pre-service teachers and practising teachers in the exploration of new systemic online learning environments as a place for professional dialogue. This was thought to provide the perfect training ground for preparing sophisticated online learning experiences for students, to enable participants to reflect on their experiences as learners, and to use their wisdom to develop practical but powerful communications experiences.

Context

The project took place against a background of general discontent with the provision of Teacher Education in Australia (Government of Australia, 2005). Numerous reports point to the limited integration of ICT in university Teacher Training programs across the country as a whole. For example, the Victorian Inquiry into Teacher Training (Parliament of Victoria, 2005) heard that:

- ICT linkages between teacher education faculties and school systems are under-developed.
- ICT resources and applications within teacher education have not kept pace with developments in the schools sector.
- Linkages between education faculties and developers of ICT products are not strong enough.
- Experiences of pre-service teachers in ICT instruction during pre-service teacher education vary considerably in breadth and quality (p xxiv).

There can be no doubt that these observations apply to the Northern Territory. NTDEET and the university use different operating systems, CDU pre-service teachers do not have immediate access to LATIS and, although linkages between the School of Education and the Department have become more extensive with the Graduate Certificate in Education (ICT), impediments are still encountered. The department embraces Jameson's Toolbox and CDU employs Learnline. Moreover, knowledge of the applications of ICT to educational programs is extremely varied, both amongst staff in the School of Education and within the schools.

Issues surrounding ICT are examined in greater depth in the recent report into Secondary Education in the NT (CDU & NTDEET, 2004) carried out by Gregor Ramsey. However, whilst acknowledging the potential of ICT to serve the new pedagogies outlined in the report, the focus is restricted to ICT as service delivery and says little about strategies for integrating ICT across the curriculum or embedding ICT in the work of schools.

The report draws attention to the poor provision of infrastructure, the under-utilisation of school capacity, the disadvantages of the LATIS system, the lack of equity, the limited professional development in innovative uses of technology, the sporadic use of interactive teaching practices, and the failure to provide sufficient technical support.

With regard to LATIS, the report highlights: the teething problems experienced with the hardware without considering whether these are in fact fundamental flaws; the use of Star Office instead of the more popular and widely accepted Microsoft Office; the problem of insufficient bandwidth; and poor access to technical support. A number of these issues combined to cause difficulties for both novice and experienced teachers during the PICTL project.

The report confirms that:

> Students consistently reported lack of access to computers; poor or slow Internet access mainly due to centralised or default decisions about blocking Internet sites based on economic rather than educational considerations (too big a download). They were also still unable to submit assignments electronically, *a situation that many teachers and schools were not ready to manage, both temperamentally or technologically* (para 60, emphasis added).

Difficulties relating to Internet access have not yet been resolved. One consequence of this is that a number of pre-service teachers have ventured some unfounded theories to explain why this situation occurs, including the conspiratorial view that some university web sites are deliberately blocked because the Department does not want to lose control over what teachers should be learning. Whilst we believe that this is not the case, it is because of some teachers' lack of confidence shown in the LATIS architecture, and the restrictions imposed, that such views are expressed.

The need for higher aggregate bandwidth services addressed in the report does not yet appear to have been resolved, in spite of the NCF (National Communication Fund) joint project between NSW and the NT into interactive e-learning addressed in the report.

There is herein an access and equity issue involved with the provision of resources. The report draws attention to the creation of a digital and cultural divide in spite of the potential for ICT to transform education, and to the leveraging of ICT to support innovative models of pedagogical practice.

A number of staff at CDU make use of ICT in their course delivery, but there is still no unified, system-wide approach. Not all units are taught through Learnline and those that are, do not make extended use of the options available. Generally staff take their internal courses and put them on Learnline with little understanding of how the medium can be exploited and the changes which are necessary. This can be seen particularly in the feedback to pre-service teachers provided by tutors and the way in which the Discussion Boards operate (Grenfell, 2005). The common introductory units, which all pre-service teachers at CDU have to take, provide an introduction to basic computing skills including word processing, spreadsheets, and web searches. Collaborative writing using Writeboard is also encouraged. Nevertheless, there is only limited use of hypermedia or interactional learning. A few staff are pioneering the use of mobiles and tablets, and some are engaging in podcasting. E-portfolios have been used with pre-service teachers over the last two years.

Within the undergraduate courses, all pre-service teachers have to obtain the eTicket, although some staff have concerns about that approach. There is also a second year unit EDB209 Technology Education course which used to have an extended IT and ICT pedagogy component. Recent changes now focus more closely on the NT Curriculum Framework and the use of ICT to explain how something works. Integration of ICT with other units tends to be unplanned and ad hoc.

Dr Greg Shaw, who assisted the PICTL project in its early stages, believes that all pre-service courses need to have:

- an embedded ICT skill development element linked to unit content and tasks;
- a generic unit that deals with issues related to ICT in education and ICT pedagogical content matters and skills development;
- an element of ICT pedagogy and ICT skills development as part of each unit.

Partnership

The inaugural meeting of the Steering Group brought together: the Local Project Evaluator; the two school-based PICTL coordinators, comprising the Principal of the urban school and the acting head of the middle school in the rural school; the mentor teachers with whom pre-service teachers would be working; three CDU members comprising the project convenor, the Coordinator of the Graduate Diploma of Secondary Education and the Senior Lecturer in charge of ICT and Education; and two members from NTDEET responsible for ICT curriculum, with responsibility for liaising with the two schools. These representatives comprised the "partnership".

Membership of the group was fluid, with different people attending the workshops at different times. The Coordinator of the GDSE was awarded study leave, and the Senior Lecturer (ICT Education) undertook several consultancies overseas. The partnership was not an organic partnership in the sense used by Goodlad (1988), but was "forced" or inorganic and some members brought past histories of confrontation with them. Whether such partnership can be considered "models" of pre-service education and professional learning is therefore an open question.

When the different partners hold radically different views on what constitutes professional development and how this should be delivered, tensions are unavoidable. The partnership model adopted by the university envisaged a deliberately-loose association with the emphasis on professional *learning* rather than *development*. It was deliberately non-interventionist and provided the schools and teachers with considerable autonomy. In the view of the project manager, collaboration and professional learning were contingent, and contextual. In projects of this kind, we are dealing with individual subjectivities and find ourselves working in the "swampy lowlands" identified by Schön (1983) rather than the stratified, rarefied higher ground assumed by project officers and funding bodies, and the outcomes are invariably "messy".

It was intended that participants would see themselves as co-learners in a community of learners where each would be able to contribute. Communities of learners cannot be appropriated by curriculum bodies. Genuine, authentic collaboration is an organic process which can be fostered, provided for and supported, but withers if mandated.

Project design

When the project was originally conceived it was intended to use a Darwin-based secondary school together with its feeder schools, and a rural school cluster, in which collaborating teachers and mentors would then collaborate with university-based teacher educators and pre-service teachers to develop e-learning portfolios. It was also expected that the pre-service teachers allocated to the schools would number between six and eight in total. In the event, the practicum arrangements for Bachelor of Education (Primary) pre-service teachers prevented the involvement of feeder schools and only two teachers were allocated to each school.

The process was expected to involve:

- peer coaching;
- the building of an online identity;
- developing familiarity with Web-Quest, Latis, Jamieson's Toolbox;
- collaborative writing using online response journals;
- use of blogs to design curriculum learning experiences based on NT Curriculum Framework;
- implementation of ICT across the curriculum within school/cluster;
- development of self-evaluation and self-efficacy.

Fourteen Graduate Diploma of Secondary Education (GDSE) pre-service teachers expressed a desire to work with PICTL, whilst their colleagues were to investigate LATIS and MyInternet which the Catholic system was considering introducing. Of these 14 pre-service teachers, two were to work in each of the selected PICTL schools. The remainder chose to implement e-portolios in their practicum schools in conjunction with their mentor teachers, undertake some peer coaching where necessary, and act as critical friends as the project unfolded.

One of the strengths of the project was thought to be the diversity of ICT experience amongst the pre-service teachers. The group included one pre-service teacher who had had her own ICT business, one who had engaged in podcasting whilst teaching ESL in China, and a Canadian pre-service teacher who worked for a couple of years in an online university. Even some of those who claimed no in-depth knowledge of ICT have, nevertheless, demonstrated the ability to think like "digital natives", appearing quite unfazed by set backs, as their blogs demonstrate.

It was hoped that portfolios would contain:

- archival material such as lesson preparation, policy and procedures documents, and school action plans;
- short video clips to demonstrate integration of ICT across subject areas to meet professional standards of teaching at the four levels;
- extracts from planning and review meetings recorded on digital voice recorder with subsequent analysis to assist in building collaboration and teamwork;
- case studies of individual class projects involving ICT;
- examples of particular ICT techniques such as the development of knowledge forums based around the original concept of Scardamallia and Bereiter.

Participants would also engage in the joint production of a shared annotated resource file/website dealing with electronic knowledge sources, ICT teaching techniques, management of learning and so forth. PICTL was built into the assessment for the unit EDB420 Teaching and Learning. The assessment rubric can be found in Appendix 3.

Expected outcomes

Some of the expected outcomes were:

- Development of case studies, simulation and role play activities for use in teacher preparation and professional learning within the school system dealing with mentoring and peer tutoring.
- Collection of exemplar portfolios for instructional purposes.
- Improvement in the quality of workplace learning as recommended in the NQUITSL project to improve the quality of workplace learning in the practicum and provide the basis for greater congruity between university-based ICT and NT Departmental initiatives.

Professional learning strategies

The professional learning strategies to be employed included:

- The development of reflective dialogue in online communities of practice.
- A collaborative action-learning focus, whereby professional learning is progressed as a result of careful and systematic reflection and sharing of individual learnings and understanding.
- Subsequent analysis in terms of activity theory which looks at the inter-relationship between the component parts of a system from an ICT perspective (Hewitt, 2004).
- Targeted seminars focusing on critical incidents in the management of learning using ICT, online conversations using Learnline and where possible, short site visits.

For pre-service teachers

- Focus was to be on a small number of pre-service teachers in their final year who wished to undertake workplace learning in ICT during the practicum at a remote, rural location, or who were seeking placement at a Darwin high school. This would provide participants with the opportunity to identify those variables which contribute to the successful introduction of ICT into subject areas and across the curriculum.
- Co-designing of ICT tasks with university-based and school-based teacher educators relating to achievement of professional standards.
- Sharing the results of their action learning through joint online (synchronous) conferences, teach-ins, and expos.

For schools

- Teachers from the selected schools would have the opportunity to act as mentors and facilitators of learning and help develop a shared approach to the compilation of electronic portfolios, as well as to engage in co-teaching with pre-service teachers.
- Would assist in developing greater congruency between teacher education involving ICT and the approach used in the schools.
- Could contribute to the growing research literature on electronic portfolios by co-authoring articles with other members of the learning community.

For the university

- Enhanced learning opportunities resulting from working in a community of learners.
- Increased opportunities to collaborate with practising teachers and overcome some of the difficulties which can arise in the classroom implementation of ICT, particularly in a rural, remote location.
- Contribute to improved undergraduate programs.

Local research questions

- What are some of the practical difficulties and enabling factors in creating successful online communities of learners in rural and urban locations?
- How does the use of online environments by stakeholders influence their curriculum interpretation? How does this influence other teachers to use online activities?
- How do stakeholders value pre-service teachers' online portfolios?

Data collection and analysis

Data collection involved gaining access to individual blogs, records of meetings and workshops, archival material, e-mails, and transcripts of interviews carried out during site visits. Darwin is a relatively small city and thus information was also acquired in informal conversation at the markets and the local shopping centre.

The data have been analysed following an interview protocol provided by the National Project director for site visits. Only the work of pre-service teachers allocated to the two PICTL schools has been analysed as at the time of writing; other pre-service teachers involved in the project are still submitting their work for assessment. At the urban schools participants were interviewed as a group. At the rural school it was possible to speak to each participant individually.

Other demands have prevented the normal member checks which accompany this kind of work, and other participants outside the School of Education have not had a chance to comment on the contents of this report. The findings of this report represent a university view and can only be considered tentative.

Results

It became very clear at the workshops that the co-operating teachers (or mentors) and the pre-service teachers allocated to the schools preferred to develop their own school-based projects incorporating e-portfolios without conforming to any predetermined approach or imposed criteria. This meant that they could take into account the ecology of the school, timetabling, school action plans, curriculum integration, resource availability, and so forth. Participants felt that to attempt to introduce e-portfolios at all levels as suggested in the proposal would not be possible.

Although the overall aims of the project were over-ambitious, some progress was made with the development of portfolios in one of the participating schools, and the pre-service teachers and some practising teachers did become involved in the exploration of a new systemic online learning environment as a place for professional dialogue.

The project did not get underway until very late so only limited progress with the integration of ICT was achievable. However, the potential of the project to foster synergies in the use of ICT was demonstrated in the rural school. Evidence of this can be found in the following excerpts taken from the blogging undertaken by Grace (pseudonym), one of the pre-service teachers at the rural school.

A willingness to take risks was one of the criteria used to select pre-service teachers for the project. This was demonstrated by Grace in three ways: (1) work involving PowerPoint and transitional portfolios, (2) exploring teaching methodology using PowerPoint, and (3) exploiting the advantages of Elgg. Only the first two excerpts are presented here. The third is dealt with when the use of Elgg is considered in a later section.

1. PowerPoint and transitional portfolios

Part of the second assessment task for Stage 2 Vocational Studies requires students to develop a transition portfolio and a transition plan. With only four weeks teaching in this subject, there was not sufficient time for me to instigate the development of transition portfolios electronically. However, to encourage students (and teachers) to consider using e-portfolios in the future, I have focused my teaching over the last four weeks on providing support to students to enable them to develop their transition plan electronically using PowerPoint slides.

As students recorded information in their transition plan, I showed them how to create hyperlinks so that they could access additional career and transition information 'at the click of a mouse'. As a result, the transition plans now incorporates much of the information the students have been collating for their portfolio.

For example, where students list their 'Career Interests', they have created hyperlinks to online occupational information (e.g., using My Future or JobGuide online). As students record 'Career Pathways' for their chosen occupation, they have added hyperlinks to websites which provide information about further education and training options (e.g., if they are undertaking a SBNA they have a link to the New Apprenticeships website). Where students list information in their 'Personal Profile', they have been able to insert pictures of themselves and their families. They have also been able to insert a hyperlink to their Personal Resume. For their 'Employment History', students have inserted pictures of themselves in the workplace and some have created a hyperlink to their organisation's website. Creating the hyperlinks has extended the transition plans to include information that they would need to include in their portfolio.

Keywords: hyperlinks, transition plans, transition portfolios, vocational studies.

2. Exploring teaching methodology

Having attended lectures, conferences and workshops over the last few years I have had my fair share of 'powerpoint' and at times get frustrated with how it is used (especially when it is used simply to present text of what is being vocalised) and as such I have not been a big fan of using powerpoint.

I was really struggling about how I could explain the difficult vocabulary associated with today's topic on Discrimination and Harassment. I was about to bombard my class with a range of new words that would look and sound foreign and wanted to do it in such a way that students would actually be able to recognise and understand the terms I had introduced. Writing the words and meaning on the w/b would simply not have been sufficient, so I decided to present the information using PPT. PPT slides were presented to the class using a data projector, displaying text and images to explain the terms being used. On each slide I had key terms in bold. I got students to read key text aloud to encourage oral literacy skills. It was useful as I was able to refer back to slides and highlight words I have previously mentioned. I was also able to refer back to pictures to provide visual clues of an example of harassment (to make learning more meaningful).

An added advantage was that I could print the slides and enlarge to A3 to display as posters in the classroom.

I will certainly promote the use of PPT slides in delivering new and unfamiliar vocabulary with ESL learners!

The reasons for the limited success in achieving the outcomes of the project are discussed in the next section.

Discussion and implications

This section examines the relative success of the project based on the feedback from pre-service teachers, mentor teachers and university staff. After a consideration of resourcing in the schools it then goes on to examine the extent to which the various groups (schools, universities, government/ non-government authorities) succeeded in working together to achieve the desired outcomes, looking particularly at the role of communication between schools and university and NTDEET and the university. Shared learning and problem solving and the challenges in trying to implement successful partnerships between differing levels of educational bureaucracy are then considered before the approaches to professional learning, the future of pre-service education and the professional learning of teachers are revisited. The section closes with consideration of the possible strategies for sustaining the partnerships beyond the life of the project.

Innovation and evidence of success

Relative success of the local projects based on the feedback of participants

Success has been patchy and fitful and depends on the definition of integration and embedding adopted by the project. If we link integration and embedding to capacity building and transformative education, and then seek measurable instances of the employment of ICT for substantial educational gains as judged by actual outcomes, gains are limited. If however, we limit the assessment to familiarity and employment of learning platforms, innovative development of teaching materials, exploration and populating of learning landscapes, networking and blogging amongst pre-service teachers, and subsequent take-up by teacher mentors, then there is much greater evidence of success.

Only limited classroom-based professional learning involving school children could be detected. Best examples were found in the rural school where Grace, a careers advisor with extensive experience with Vocational Education and Training (VET), was able to develop transition portfolios with individual students.

An innovative approach to professional learning was based on current research into communities of practice, situated learning and distributed knowledge. Provision for a virtual community of learners was addressed through the employment of a learning platform (Elgg) which offered the possibility to populate a learning landscape. Elgg permitted blogging and the loading of files suitable for e-portfolios. As convenor, I drew on my experience of coordinating the highly successful Innovative Links project in the Northern Territory, an initiative which incorporated an action-research approach and which was "owned" by the schools from the beginning. (Sachs, 2003 contains a review of this project.) It was assumed that the schools in the current project would come to own the project without looking for continual external direction but this did not occur in the time available.

Resource issues

Both schools lacked sufficient resources for easy access to ICT. Grace provided readers of her blog with pictorial evidence of this (although the photographs take a long time to come up).

Often people complain about the lack of access to ICT resources in schools. Here is a brief pictorial insight into computer access at the rural school:

- *Computer 1* — a computer in the school computer lab
- *Computer 2* — the temporary middle school "lab" (note the use of laptops)
- *Computer 3* — there are two computers in the Year 10 and Year 12 classroom
- *Computer 4* — a student doing Internet research using the computer in the classroom
- *Computer 6* — computers in the "lab"
- *Computer 7* — whole class access to computers is available in the computer "lab" set up in the Library with ten computers (only four were operational yesterday).

The situation at the urban school was even less encouraging:

> Ultimately it would need a lot more class time to consider the actual issue of using technology, and there's a lot of time when the technology fails and computers crash. They are very old here. Three labs but competing for class time. Basically getting a technician in the school is an issue. Elgg is probably way down here compared to getting a computer in the first place. (Teacher)

These were schools which were selected because they were thought to have sufficient, reliable, resources to support the project. It is clear that little progress has been made on resources for urban and rural/remote schools in the three years since *Future Directions* was published.

Partnerships

The extent to which the various groups (schools, universities, government/non-government authorities) succeeded in working together to achieve the desired outcomes

In retrospect, collaboration could have been substantially improved by extending the dialogue that occurred beyond the two working parties that were set up initially to establish the project. This would have increased the levels of trust and personal commitment. It would have helped to mitigate any negativity associated with decisions which were not unanimously supported such as the university's decision to adopt Elgg at the first workshop. Any disquiet, rather than being confined to webblogs and private e-mails, could have been put on the table as it were, and dealt with more openly and effectively.

Communication remained a problem throughout the project — communication with schools regarding practicum requirements and PICTL, and communication between the Project Manager and NTDEET.

Communication with the schools

The extent of this problem only became apparent during the site visits at the end of the project. The scope and intention of the project was outlined at the first workshop and a paper outlining the roles and responsibilities of the participants was presented (Appendix 1), together with a paper on e-portfolios (Appendix 2) and details of the assessment of the ICT component of the practicum unit which included PICTL (Appendix 3). The pre-service teachers were introduced to their respective mentor teachers and the Principal of the urban school was present together with the Acting Head of the middle school at the rural school.

It was therefore somewhat disconcerting to be told by one of the mentor teachers during a site visit that:

> Communication from Uni to the school was something we had a big problem with, even from our Principal to us. We had no idea that pre-service teachers were involved. If I'd known prior, I could have altered or designed specifically to come up with a portfolio to come into Elgg. I had no idea pre-service teachers were involved.

It was true that this teacher had joined the first workshop late but we had assumed that by the second workshop, the nature of the project was clear, particularly as the assessment item for the unit had been distributed. This incorporated a specific PICTL based item (Appendix 3). Yet the teacher maintained she knew nothing about the requirement for the "critical conversations" the pre-service teachers were asked to engage in.

> Again this was something we knew nothing about. If we had had more information from the university, this would have been great. This required a discrete project. You are not going to have many students getting a chance to do an e-portfolio, unless they are doing a computing subject.

Criticisms of university communication with the schools are frequently voiced and university staff have taken steps to forestall this. Eleni, the GDSE practicum coordinator, commented:

> But I actually gave them the assessment sheets. I presented them at both workshops. This is just reinforcing a hierarchy and reveals a complete misunderstanding on their part. I have the agenda a lot of what we talked about at the meetings. They were saying they didn't want to try anything in front of their students that they didn't feel confident with, and that they wanted to do it on their own. At no time did they ask questions about it, or say, 'No I don't want to do that.' Our students understood. 'Yes, we're right across it.' In transformative education projects this happens quite often. We've had similar problems in the past like 'Battle of the Bands'.

In trying to find a possible explanation for what had occurred, it seems we are dealing with an embedded Departmental culture. When I asked Eleni if this was so, she replied:

> I absolutely believe this to be the case. The problem is with communication on the DEET side. Huge amounts of effort have been made to communicate, but it's misunderstood or ignored on the other side of the fence. Teachers who actually do the work are not told why the prac is different. They are never told about the contextual stuff. Therefore they quite rightly expect to be told what to do step-by-step. They're not, because the administration at the schools say 'Got that?' That's me talking as a teacher. The PICTL project has gone like others before it such as Professional Learning for Mentor Teachers.

Communication with NTDEET

Communication with NTDEET has not been ideal, partly because the choice of Elgg as the medium of dissemination was contentious, but also because the project's management was subjected to some criticism.

Shared learning and problem-solving

This was complicated by the different types of knowledge which participants brought to the project and their contrasting views on how it should be made available. Some participants conceived of knowledge as generic, systemic, transferable — that is, as a shared good that was available to be distributed among the group — while others preferred to hold on to their domain (or platform) specific knowledge. Such contrasting approaches resulted in a perception that the university view was bureaucratically naive and technologically inappropriate, whereas others saw the Department's failure to share ICT content knowledge as proprietorial. These are distorted generalisations but they were somewhat in evidence when assistance was sought by participants as they tried to discover how to use Elgg.

Challenges in trying to implement successful partnerships between differing levels of educational bureaucracy

As has already been seen, there is a distinct difference in the culture of the NTDEET and the School of Education and there was little shared understanding of the working of a community of learners in one of the schools. For example, whereas in a community of learners decisions are made collectively and parallel leadership is employed, some educational departments still maintain a very hierarchical conception of educational management. Part of this culture is a hard-nosed, but understandable, a 'what's in it for us?' approach. Synergies are difficult to achieve if one of the partners does not believe they are getting anything out of a project. Another difference in the culture is the way that 'complaints' are dealt with.

Approaches to professional learning

The School of Education adopted an approach which sought to liberate and empower teachers to make their own decisions, encourage connection and networking, and promote sharing and collaboration. This was to be achieved through the building up of an organic community of learners which rejected hierarchical controls and external, prescriptive, outside-in approaches. The development of a respectful, relational language was considered to be critical to our success.

The assumptions made by the university about how professional learning is best achieved contradicted those of some of the teachers in the project. One teacher complained that she had not been provided with a step-by-step process of what she had to do.

> I need a step one 'do this!'… Your head's running around outcomes here and I want written confirmation. I don't want an airy-fairy system that I have to figure out in my own time.

This preferred way of working caused the university participants considerable consternation, as it represented a top-down style associated with the "delivery" of professional development rather than the promotion of professional learning — a "just tell me what I need to do and I'll go away and do it" type of engagement (as one of the university participants expressed it). The university staff found this view contradicted all we believed we should be trying to do and we would have abrogated our responsibilities in terms of running the project if we had acceded to it.

Nevertheless, the views expressed do need to be taken seriously. They suggest that, besides establishing criteria for pre-service teachers coming into the project, we also should have proposed criteria for teachers and schools. The philosophy driving the university approach to professional learning was canvassed with participants at the inaugural steering group but was not addressed at the workshops.

Future of pre-service education and the professional learning of teachers

At CDU we did not regard the practicum as the panacea — merely a way of connecting — forced on us by the over-structured, restrictive organisation of our PST programs. At the National PICTL Forum it was suggested that we should dispense with the practicum and PD as currently constituted, and institute an approach to collaborative learning based on Communities of Learners.

All this was reinforced following a site visit to one of our schools where the pre-service teachers had not made the progress with students in the classes that they had intended. The reasons they and their mentor teacher gave, included:

- demands of the SSABSA (subject-based) syllabus must take precedence;
- planning had already been undertaken by the mentor teacher with little room for change;
- the lack of preparation time prior to the practicum was insufficient;
- unavailability of computer labs and equipment.

The mentor teachers needed a much more structured, step-by-step program which should have begun at least six months earlier. They also wanted handbooks from the university dealing specifically with the PICTL component as "we shouldn't have to learn about what is required from the pre-service teachers". The university staff made the mistake of assuming that all the participants understood what was involved in building a community of learners. The concept of being a co-learner needed to be explicitly discussed.

The PICTL project in the NT operated within an old paradigm which is no longer adequate. During the site visit to the urban school, even the reliance on the mentoring system was challenged. One of the teachers claimed that there would be a better degree of success if the university began more gradually and mentors were informed by the Assistant Principal of the requirements:

> We have to be told the pre-service teacher's need to do an assessment piece, because teachers don't want to do more, or deviate too strongly from the program.

Her colleague linked this to the problem of finding mentors:

> There's a problem there. You have to find mentor teachers who are willing to take on pre-service teachers and there's already a shortage. We need specific guidelines. Teachers won't want to go to workshops and things like that. They want to go for their professional learning in their classroom, not for the teacher-mentor relationship.

Because we are dealing with a failed paradigm, a solution may be to adopt The Teaching School (a version of the Professional Development School) which the School of Education is currently setting up as part of a new Bachelor of Teaching and Learning (Turner, 2006) program. In our case, the new program will incorporate a number of the features of the Bachelor of Learning Management course developed at Noosa. It was the PDS concept which first attracted the university staff to the PICTL project. PDSs in the US and Canada incorporate boundary crossers (teachers jointly paid by the universities and the districts who had experienced both the culture of schools and the culture of the

universities), home rooms and conferencing facilities at the hub school to permit workshops and seminars, provision for community outreach and inreach, a career track in professional development and teacher development, and continuous daily interaction at a variety of levels.

The Teaching School is often thought to be just the same as the old demonstration school. This is unfortunate because if the Teaching Schools are correctly instituted, nothing could be further from the truth. The problem is that the Teaching School requires resourcing. In the NT this problem has been overcome as extensive funding has been forthcoming for developing the new Bachelor of Teaching and Learning degree over the next three years. People can be taken offline for up to 50% of a load to develop the Teaching School concept. Schools are now nominating to be Associate Schools (a variation on the old Associate Lecturer concept) and will have to meet stringent criteria before they are accepted. The PICTL principles can be embedded into our current planning so that when we revisit the Graduate Attributes we can ensure they are respected. Currently, few statements of Professional Standards incorporate the PICTL principles and fewer still have accompanying indicators which allow for standards and quality audits.

The following suggestions for alternatives to the focus on e-portfolios were made by one of the mentor teachers at the urban school. She envisaged a choice of:

- hard copies of lesson plans or electronic copies;
- hard or electronic copies of assessment tasks;
- hard or electronic copies of student work;
- an electronic journal with set questions to reflect on in the blog, and other optional pathways;
- electronic conversations with peer pre-service teachers or at least with one mentor teacher with topics and threads suggested by the university;
- electronic options of a portfolio should be given in Semester 2, requirements in Semester 1 do not give the pre-service teachers the opportunity. They can contact teachers in Semester 1 to establish topics/times/resources needed in Semester 2.

These suggestions are useful because they reflect the continuing need to rely on hard copies in certain circumstances, reveal the need to run such a project over a more extended time scale (at least a year in this instance), suggest the need for more information on blogging and how to initiate it, and formalise the electronic conversations. Whilst the university would baulk at providing set questions which might limit and restrict student learning, the provision of open-ended avenues of inquiry is essential.

Possible strategies for sustaining the partnerships beyond the life of the project

If this partnership is to continue, measures will be needed to rebuild trust between the DEET partners and the School of Education. This could be achieved by employing some of the techniques included in the study of parallel and distributed leadership by Crowther, Kaagan, Ferguson and Hann (2002). Amongst these techniques are: activities to elicit group readiness to engage in transformative leadership through compiling Group Portraits and carrying out self-surveys; reviews of past interactions that have inhibited the growth of the professional community to which one belongs; exercises to uncover barriers and controls which impede collaborative undertakings; and ways to analyse the power of language.

Intercultural change cannot be predicted or mandated in advance because of the subjectivities of the participants, but once genuine, heartfelt, willing collaboration is attained, cultural change takes place imperceptibly. Certainly some explicit work on what it means to collaborate will be necessary, and occasional recollection periods are required. It cannot be taken for granted for instance, that everyone is committed to working with junior colleagues and novices in a community of learners or is comfortable with a mentoring role.

Since the practicum experience as presently constituted is a failed paradigm, strategies should be devised to ensure closer working between schools and the university to ensure that teacher education is systematised. Joint blogging needs to be encouraged between pre-service teachers and their mentors reviewing ICT initiatives to which both can contribute. Such a program of rebuilding and renewal would also involve those in the Teaching Schools working with both the pre-service teachers and the Mentor Teachers.

The CDU, with the assistance of its partners, is currently reviewing all its programs and courses in a series of programs and workshops. At the same time, an ICT option has been included within the Graduate Certificate of Education program. One of the initial tasks of the review is the drawing up of graduate attributes which address all areas of teaching including ICT. These attributes incorporate the Professional Standards promulgated by the Teacher Registration Board. By revisiting the desired outcomes and indicators, it should be possible to provide for the development of innovative projects and to make these assessable.

Project management

The initial scope of the project proved much too extensive and unmanageable. The original idea was to use e-portfolios as a way of embedding ICT practices throughout the selected schools at a number of levels. Appendix 1 details the scope and methodology which was envisaged. As a result of this realisation, it was decided that the mentor teachers, working with a school-based PICTL project coordinator, would discuss with the pre-service teachers how each school would progress the project depending on the ecology of the school, the available resources and the context of learning. These groups were to determine, well in advance of the beginning of the practicum, the scope of each project. They were asked to keep the convenor closely informed of the details of the proposed project so that the university could be fully involved. This did not happen for a variety of reasons. Firstly, once the pre-service teacher's were immersed in their course, they could not find the time to negotiate with their mentor teachers. Secondly the mentor teachers themselves found that they did not have the time or resources to devote to the project, and consequently looked for a step-by-step procedural guide or handbook which was not forthcoming. Thirdly, the loosely-coupled approach chosen by the Project Manager did not provide for initiating weekly updates or permit intervention.

Necessity of whole school or system-wide reform

All the strategies for change proposed in answer to previous questions envisage priority being given to whole-school professional development within a system-wide reform. Proposals for Teaching Schools are predicated on just such a requirement. However, it is essential that system-wide reform allows for teacher control and autonomy over ICT project delivery within prescribed boundaries determined by the Department and other education providers. The two schools involved in this project have vastly different histories, socio-cultural composition, and very different needs and priorities. Any model or approach which increases teacher dependency on Head Office personnel or attempts to serve university purposes, limits schools' innovative capacity and responsiveness.

Change-management issues faced in trying to achieve these reforms

This relates closely to the need to transform teaching and learning environments. The issue of cultural dissonance must be emphasised. This dissonance extends to considerations of time and space; understandings of teaching and learning; issues of power, authority, seniority and control; attitudes towards autonomy and dependency; the ability to create conditions for creativity; and comfort with risk-taking.

The selection and use of Elgg as a learning platform

Elgg was recommended by one of the staff lecturing in ICT at the university. Initially it appeared to offer what we wanted: blogging capability; file collation for e-portfolios; networking with friends; and security. However, what appeared to be a straightforward process after completing the Elgg tour, became something of a nightmare. The help page or tour of Elgg was not found to be particularly useful. One of the mentor teachers would have preferred a handbook as "I hate reading from computers and want to see it on paper". This might be taken as an approximate measure of how comfortable some members of the group were with computer-mediated information generally.

In view of the versatility of the group, it was assumed by the university staff that the knowledge distributed across the group would assist us to solve the problems which arose. However, after the first workshop there appeared to be a degree of negativity amongst some of the participants and a feeling that Elgg just wasn't worth bothering with. However, Elgg provided a challenge to the ingenuity of the pre-service teachers and at the second workshop it was decided that we would continue to experiment with it, and the meeting ended on a confident note. One of the main problems encountered was that after inviting people to my blog, not everyone appearing amongst my "friends" could gain access, although they appeared as members of the group. Fortunately one of the pre-service teachers found a way around this, which she shared with the group. Nevertheless, the use of Elgg for dialoguing and sharing ideas was limited.

The constructive and purposeful response of many pre-service teachers to the use of Elgg is typified by the following e-mail which was subsequently incorporated into the writer's blog:

> My idea about using ELGG is about using Elgg as a base to set up e-portfolios as the centre of collaboration between us. I think that we have a rare opportunity to help the ELGG developers create a really great tool by exploring what other sites have to offer and what we would actually need to include as features in the ELGG system. I think that it has a lot of merits but also some problems that need to be resolved such as privacy settings being limited to only one community or all uses. Two different communities can not be selected for an individual web blog posting. The need for more memory space, and the inclusion of things like a photo album? However ELGG as a forum for discussing the development of e-portfolios and what they might include, is perfect. A great place to gather and share information.
>
> Secondly, there is no reason why we should only limit ourselves to ELGG as it has the capacity to use hyperlinks that can direct users to other WebPages that a portfolio owner might also incorporate into their e-portfolio such as a personal webpage or PBWIKI etc. I see that ELGG itself has the potential to be an E portfolio INDEX or main folder, where people can go as a starting point, and be directed into information held in other sites that users might like to include. I also think that it is essential that we look at other web blogs and online tools to be able to thoroughly critique the ELGG system and create something uniquely tailored to suit the needs of this project by providing feedback. Remember this project is also a way of creating partnerships between schools and the university so I think it is important that we all give it a go and try to find ways of working through the bugs. If Mike can organise more memory space for the e-portfolios then all the better!
>
> Other questions to consider for practical applications are: Do we need or want a uniform portfolio with guidelines and restrictions or would it be up to the individual? What should they include? What important information would/should be included for the students or for the teachers? Do we need to create a format? How do we find a particular portfolio in cyberspace? How much memory do we allow? Privacy levels, who has access and who is restricted? What is it exactly that we want from an e-portfolio? How can Elgg help? (Alexandria, 6 April 2006)

This e-mail demonstrates the way in which the PICTL project has encouraged participants to explore the different possibilities of learning platforms such as Elgg. Since the e-mail I have approached the designers of Elgg to provide us with additional space but have not yet had a response.

In trying to work with Elgg, several participants identified other sites which support other discussion boards such as phpBB: Creating Communities at <http://www.phbbb.com/index.php>. One of the pre-service teachers at the urban school preferred to use this site for the project. Others were forced to use Learnline to provide the necessary facilities for blogging and e-portfolios.

The university decision to use Elgg caused immense frustration for some participants. However, after an uncertain start, three of the four pre-service teachers used Elgg extensively and were convinced of its potential. For example, Grace, at the rural school, didn't find Elgg particularly useful at first and struggled with the idea of how she would use it in class:

> It was not until I started blogging that I got excited about the potential as it can establish community-shared views. Earlier discussion at the workshop actually soured my views and made me hesitant. Some people said it wouldn't be appropriate to use with students but you have to see beyond the confines of Elgg to the concept of a learning landscape.
>
> It's easy to jump on line. I realised this when access was out for a week during the cyclone [Cyclone Monica which came in over Maningrida but spared the community in which she was teaching]. It was hard to write or say anything for a week but once back on line I started blogging.

These views are reiterated in her blog:

> After a week of daily blogging and explicitly looking at the use of learning landscapes such as Elgg, I have a few insights that I thought might be worth sharing.
>
> I am having trouble trying to articulate my thoughts on Elgg, and I think the easiest way is to sum it up with the phrase 'beauty is in the eye of the beholder'. How one uses Elgg will depend on their willingness to give it a go and think laterally about its applications. I personally thought, as others have also expressed, that in terms of the PICTL project, Elgg would not be a useful tool for use in schools. It seemed that after our first look at Elgg, that its primary application would be as an online community to share our experiences and for reporting our findings on integrating ICT for the PICTL project. Our early community blogs which discussed whether it would be suitable for students, along with not having a meaningful purpose for using Elgg soured my view of its potential.
>
> It was not until this week, after using Elgg to present a daily log of ICT events at the school, that I saw its potential. Even more so when I was 'showing off' to my mentor teacher how I was blogging to share what I had been doing with others involved in the PICTL study. This teacher then grabbed Elgg and off she went — developing a new community, uploading files, and simply giving it a go to see whether it would be a useful tool for her Vocational Studies students. It would seem that Learning Landscapes have the potential to be a valuable tool and it is up to individuals to make them work for them. Learning something new requires time and commitment. Logging into Elgg on a daily basis, even if at times it's just for a few minutes, has provided an opportunity to see its potential through new eyes. Give it some time and you might be surprised!

There were some difficulties, however. Most participants did not find Elgg particularly user-friendly. According to Grace, teachers want such a platform to be comprehensive and do everything. For example, she tried to use the calendar but couldn't tell the difference between what she had entered and someone else's entry. There appeared to be only room for one option:

> If you are going to have a learning landscape used by teachers, it has to be a one-stop shop. How does a learning landscape fit into report writing, for instance? You need to go beyond basic functions.

Grace also found the space limitations disappointing:

> Half-way through loading up, I got this message. Obviously if you can't upload the file, you cannot link across. If you're not using it on a regular basis and tapping into it, it's difficult. When we first got together, I didn't see the true potential. We were not in the school environment and I couldn't see how it might be useful on prac and people didn't get back into it.

Paul found Elgg was time consuming:

> I'm technologically literate and it's not user-friendly. Time is the key factor. I'm just too busy. Just the time needed to learn the basics! I tried several time to get my photo up and couldn't do it. Maybe there's a system error here. It's very frustrating. I uploaded a couple of files to do with learning in the classroom. I took some video of what the class was like before Matthew got here, but I couldn't upload it. It wasn't even that big. I mucked around with it for a while.
>
> I guess if I had a job that involved having a desk with a computer and I sat there … It's good to show me what she's been doing. She's found a way of using it. For Matthew, it's not worth that. For me it really became a nightmare. I still think it's got some benefits but as far as using it for student portfolios here in Middle School, if I can't even use it … Now we've got to use e-Tool, I can see where we can use it quite meaningfully there — linking evidence like little sound bites, some of their best speaking, can link assessment to that sound file. This is heading towards e-portfolios. That, and maybe some digital photos of them learning something. I don't want to scan in something for the sake of scanning it in. We are starting with e-Tool this afternoon. I have to teach it to my staff. It's part of SAMS, the Student Management System. Enrolment details, the roll, now an assessment aspect. I like the way its heading. It's easy to enter the data. It's useful but whether it actually happens or not, who knows?
>
> The restrictions on access to community blogs that Elgg permits enabled teachers to observe Indigenous cultural rules. 'You can only view it if in the PICTL friends for our group. We wanted to keep it like that. The community does not wanting pictures of kids floating around.'

Proponents of blogging assume that teachers will want to share and learn from each other, but that may not always be the case. There is a gap between the rhetoric surrounding the rationale for using blogging and what actually happens. In the event, it boils down to commitment and preferred ways of working. Matthew, for instance, made little use of blogging and confessed:

> I still need to get on. I've got my profile on but still need to use it. Grace was doing it to meet the assessment criteria for a certain purpose. She's written several thousand words, but there's no comment. Nobody's read it. I don't really want to sit there and read all her information. If there is a brief statement about something out here, I might be interested but I'm not all that fussed.

The pre-service teachers at the urban school chose to use blogging as part of the reflective process on their teaching, which was also a focus of the national project. For example, Alexandria in a humorous passage, relates the nightmare of "flying solo" for the first time:

> Well when I woke up this morning I was so terrified I was sick to my stomach I couldn't sleep and I couldn't prepare enough! I tried to be soooo cool! but I just felt sick inside! I'm going to stuff this up I just know it! I walked into the class… I was handed the role and after a few needy hours of mentoring, that was it! I was on! THIS IS IT, AM I GOING TO SURVIVE??? DURING OBS I JUST KNEW I WAS IN TROUBLE! THE KIDS STARTED TALKING OVER ME, THEN THEY THREW THINGS AROUND THE ROOM! THEY PICKED UP CHAIRS AND THREW THEM AT ME! THEY COMPLETLY DISREGARDED ME. I was wearing the worst green outfit with red shoes they were all laughing at me, AND THE PRINCIPAL AND A FEW OTHER SENIOR TEACHERS HAD TO COME AND SETTLE THE KIDS DOWN BUT THEY COULDN'T! … THEN I WOKE UP OF COURSE GOT READY FOR SCHOOL AND WENT TO TEACH MY FIRST CLASS! HA! HA! GOTCHA!!! I did ok. I was really nervous though! Everything is pretty much true up till the time I walked into the door! My mentor was quite positive and …

Conclusions and recommendations

This project began late and as a consequence there was a continual rush to meet deadlines and few of the intended outcomes were achieved. However, the project has thrown into relief a number of issues which need to be addressed in the future. These include:

- The role of the project manager in such projects and how directive and interventionist the project manager should be, given the amount of time which could be accorded the project.
- The need for more regular dialogue and improved communication at all levels.
- The continuing need to address the different cultures which exist in the Department of Education and CDU and make provision for open and honest discussion.
- The nature of collaboration and how this can be provided for.
- The need to incorporate ICT more extensively in the current review of pre-service education courses within the School of Education and provide for annual audits.
- The discrepancies between the operating systems relied on by the Department and the university and the inadequate resourcing found in the schools.
- The best way to promote professional learning to ensure the uptake of ICT content knowledge and pedagogical knowledge.
- The need to refocus on the role of communities of learners.
- The need for Teaching Schools incorporating a number of the features of professional development schools.

Implications for pre-service and professional learning programs locally

- Ensure provision of ICT content knowledge through dedicated units for pre-service teachers and ensure availability of resource personnel at workshops for professional learning of practising teachers.
- Introduce properly staffed Teaching Schools to increase synergies between pre-service teacher education and professional learning of practising teachers.
- Provide for annual audits of all units within the School of Education to establish the degree of integration with ICT.
- Institute programs to encourage transformative leadership to overcome current hierarchical models.
- Provide for the greater promotion of risk-taking, innovation and creativity amongst pre-service and mentor teachers.

Implications for future partnerships

- Ensure the group has a shared understanding of the approach to professional learning being adopted and that all participants are fully aware of their roles.
- Design a set of criteria for schools wishing to participate in such projects.
- Work with a theory of integration and embedding and "workshop" this before beginning the project.
- Work towards resolving differences between operating systems and ensure LATIS is made available to pre-service teachers and university lecturers.
- If using a learning platform such as Elgg, employ a specialist who can give assistance and provide technical support and budget for this.
- Ensure that communication protocols and procedures are made explicit.
- Ensure the project manager and other university staff are in a position to make regular visits to schools and audit progress.
- Ensure that there is a full understanding of how communities of learners work together as co-learners. This could be achieved by online simulations, case studies, and problem-based learning.

Implications for pre-service and professional learning programs nationally

- Consider the adoption of Teaching Schools or Professional Development Schools and institute some pilot projects in each state and territory.
- Audit the progressive integration of ICT into university education programs as part of the Australian Universities Quality Assurance process.
- Provide funding to enable alignments of the delivery systems used by state and territory departments of education with that of the local state or territory.

Acknowledgement

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References

CDU/NTDEET. (2004). *Report on Future Directions for Secondary Education in the Northern Territory*. Darwin: CDU and NTDEET.

Crowther, F., Kaagan, S., Ferguson, M. & Hann, L. (2002). *Developing Teacher Leaders: How Teacher Leadership Enhances School Success*. Thousand Oaks, CA: Corwin Press.

Goodlad, J. (1988). 'School-university partnerships for educational renewal: rationale and concepts', in K. Sirotnik & J. Goodlad (eds), *School-university Partnerships in Action: Concepts, Cases and Concerns*. New York: Teachers College Press.

Government of Australia. (2005). *Senate Inquiry into Teacher Education*. Canberra: Standing Committee on Education and Training.

Grenfell, M. (2005). *Knowledge construction online: The role of the tutor*. Paper presented at the AARE Annual Conference, Paramatta.

Hewitt, J. (2004). 'An exploration of community in a knowledge forum classroom', in S. Barab, R. Kling & J. Gray (eds), *Designing for Virtual Communities in the Service of Learning* (pp. 210–238). Cambridge: Cambridge University Press.

Sachs, J. (2003). *The Activist Teaching Profession*. Buckingham and Philadelphia: Open University Press.

Schön, D. (1983). *The Reflective Practitioner: How Professionals Think in Action*. New York: Basic Books.

Turner, D. (2006). In R. Smith & D. Lynch, *The Rise of the Learning Manager: Changing Teacher Education*. Frenchs Forest, NSW: Pearson Education Australia.

Appendices

Appendix 1

Roles and responsibilities of the participants

(PICTL(NT) Workshop — 6 February 2006)

At the last meeting of the PICTL (NT) steering group I was asked to outline what I saw as the roles and responsibilities of the different partners. I found this difficult to do as (1) I did not want to appear to be speaking for others and (2) we are all in fact working towards the same ends which means that there are a number of responsibilities common to all of us. The notes which follow are an attempt to get the discussion going and identify factors which might affect the degree of collaboration involved.

1. Common to all

   Sharing our individual knowledge

   Contributing to database on portfolios

   Identifying areas where we need to know more or where our knowledge resources are not sufficient

   Building collegiality

   Providing emotional support

   Working as a community of learners in which pre-service teachers, the students in the schools, school-based PICTL co-ordinators, class teachers and mentors, and university-based personnel work together as co-learners

   Participating in PICTL(NT) workshops

   Experimenting with learning platforms such as ELGG to discover the potential of available resources.

2. University

   Overall project coordination in terms of the contract

   Convene meetings of the steering group

   Ensure hire of lap-tops for participating pre-service teachers who require them

   Liaise with schools to ensure necessary software available

   Source Graduate Diploma of Education (Secondary) pre-service teachers for placement

   Set up ELGG and invite those involved to participate

   Decide on e-portfolio requirements in consultation with other partners and post these to ELGG as resource documents

   Ensure technical support

   Make site visits within the resources of the PICTL budget

   Promote collaborative writing amongst the participants for possible conference/ publishing.

3. Pre-service teachers

   Maintain practicum portfolio on ELGG

   Maintain individual bloggs and engage with others

   Work with mentors and school-based PICTL coordinator to teach students how to maintain a work portfolio and how to upload these to ELGG

   Find/develop creative and innovative ways for the use of ICT within their teaching.

4. Schools

   Provide a site-based coordinator and teacher mentors

   Provide computing resources for students at the site

   Suggest how e-portofolio work can be integrated with teaching

   Contribute to ELGG.

5. DEET

   Advise on design, presentation and storage of e-portoflios

   Suggest ways in which the work can be linked to LATIS

   Suggest ways in which the initiative can be sustained after the end of the project

   Contribute to ELGG.

Appendix 2

(PICTL workshop, 3 March 2006)

E-portolios can be incorporated into ICT practice at a number of levels: they can be used by the pre-service teachers as a personalised account of their work which can be used to validate the Professional Standards, by students in the school who have to maintain work portfolios as part of the assessment process, and by cooperating teachers, mentors and university-based teacher tducators seeking promotion or other employment opportunities. In each case the process is slightly different, reflecting the context in which the participants are working, the purpose of the portfolio, and the audience for whom it is being designed.

The following table has been compiled from the e-portfolio process derived by Barrett, H. (1999). *Electronic Teaching Portfolios*. Retrieved 16 January 2006, from http://electronicportfolios.com/portfolios/site99.html

Stages in the process	Pre-service teachers (PSTs)	Students	Teachers and mentors
Goals of the portfolio based on competencies/ standards/outcomes/ evaluation rubrics	Beginning teacher competencies, graduate attributes, professional standards.	Record of work produced. History of attainment. Self-evaluation.	Life-long learning. Professional learning and performance management. Mentoring and supervision skills.
Software tools	PowerPoint, PhotoStudio, OmniPage, iMovie	As for PSTs.	As for PSTs.
Assessment context	Beginning Teacher Competencies and requirements of Practicum. Teacher registration. Requirements for Unit.	SSABSA approved. Outcomes.	RPL. Professional learning and advancement.
Audience	Fellow students, serving teachers, UBTEs, staffing officers, TRB	Fellow students, parents, examining bodies.	Peers.
Content of portfolio items	Evidence supporting attainment of standards. Items that reveal personalised understanding of teaching and learning. Artifacts such as still photographs, archival materials, demographic data, video clips with voice over, music. Collaborative writing including negotiated reporting with mentor/ supervising teacher.	Collection of work showcasing ICT. Teacher assessments. School-community Research projects. Clubs and social service.	Belief statements, personalised accounts, self-reflexive study, action research projects and case studies, curriculum materials. PD plans, references.

Table continued.

Stages in the process	Pre-service teachers (PSTs)	Students	Teachers and mentors
Storage and presentation medium	Determine size. CD-ROM, Zip Files, Blogs (ELGG), LATIS.		
Multimedia materials and artefacts	Links to NTCF, units of work, archival materials, photo essays, video clips with voice-overs, music and poetry.	Investigative studies, problem-based learning, collaborative writing projects.	Integration of ICT into teaching.
Self-reflection	Learning to teach — teaching to learn. Coming to know. Identity resources. Changing beliefs. Practical moral issues.	Personal growth and development, learning styles, interpersonal development, acceptance as part of community of learners.	As for PSTs plus reflexive accounts of personal involvement in PICTL project.
Feedback from teachers, colleagues, members of learning community	Collaborative writing with mentors, colleagues. Assessment of attainment of standards.	Assessment items with feedback and take up.	
Hypermedia links	Within documents: design and presentation. To websites and other sources.	As for PSTs.	As for PSTs.
Presentation to appropriate audience	Supervising teachers/ lecturers. Forum involving community of learners. Staffing officers and Board of Registration.	Teachers, parents, school-assessed components, SSABSA.	Teaching materials, workshops, PD courses.
Evaluate effectiveness according to purpose and assessment context	Competence to teach career enhancement and development.	Learner profiles looking at attainment of the outcomes.	Degree of integration achieved.

Possible approaches:

NOTE: It is up to the teacher and the pre-service teacher teams to decide how much they want to implement e-portfolios into their work in schools both in and out of classes. You can only do what you feel comfortable with. It is important for the project that we get a realistic view of how real teachers will want/be able to use these tools in schools.

- Team teach a unit on e-portfolios where students in the class set up a Blogg community similar to the one we are in and students are assessed on the e-portfolio they have created.
- Pre-service teacher supports the teacher to provide students with activities related to creating a portfolio in the future.
- Teacher and pre-service teachers set up their portfolio as a communication tool/ administrative tool and practise using it but don't involve the students.
- Students from the suburbs of Dripstone and Shepherdson use these facilities to communicate with each other to achieve a research task or to share information about their different lives in the two contexts.
- Students in a class evaluate e-portfolios and tell us what they think of them.
- Students use these to create a portfolio of information on a topic they are studying and present their findings online.

Appendix 3

ASSESSMENT 3: Portfolio to demonstrate understanding of ICT in all three domains. (30%)

Pre-service teachers should develop their knowledge of, and competence in, using either LATIS, PICTL or MyInternet systems in educational contexts. They will need to attend a training session focusing on the selected system and undertake to implement ICT educational activities during at least one practicum.

Assessment criteria

In particular the following will be assessed:

- An ability to construct meaningful educational activities that engage students using at least one of the systems currently used in schools.
- An ability to communicate with students and others using at least one of these systems.
- An ability to perform the administrative tasks of a teacher using at least one of these systems.
- An awareness of reporting procedures used which employ facilities within at least one of these systems.
- An ability to evaluate and revise activities/information/tasks using facilities within at least one of these systems.
- An ability to identify the strengths and challenges of these systems and, where possible, a comparison of them.

The Queensland NewBICTs project: A model for professional development colleges for New Basics schools

REPORT FROM THE QUEENSLAND PROJECT

Colin Baskin, James Cook University
Ruth Hickey, James Cook University
Neil Anderson, James Cook University

Executive summary

The NewBICTs project captures a process of planning and implementing activities in New Basics schools, where pre-service teachers take a leadership role in improving the breadth and depth of ICT in student work. In this pilot project, a relationship between two clusters of schools, undergraduate teachers, and university staff enabled undergraduate teachers to be mentored as part of a project management approach to initiating innovation, while drawing on the expertise of school-based champions of ICT use. The project goal was to construct a Virtual Professional Development College in the form of an electronic action-learning data base and repository. This could be used by pre-service teachers, teachers, university academics and teacher professional development providers, to tie local ICT innovations and New Basics initiatives in schools more closely with learning, teaching and research programs within the School of Education at James Cook University (JCU). Early project findings indicate that the NewBICTs project has opened possibilities for pre-service teachers to influence the strategic uptake of ICT at the school level by creating (1) new spaces, (2) new identities, and (3) new partnerships. The project revealed:

a. There is a need for each school to locally define and manage ICT uptake.

b. There is a need for schools to plan for innovation.

c. Schools should enlist community effort in ICT.

d. Schools need to seek partnerships in the ICT journey.

e. All teachers in this study rated highly in terms of ICT variety and use in teaching, ICT and Curriculum Integration, ICT and Curriculum Embeddedness, ICT and Curriculum Alignment, and ICT and Attitudinal Effects.

f. Current service teachers rated pre-service teachers highly in terms of ICT efficacy for rich task teaching. In particular, pre-service teachers are more likely to be innovative in their uptake and use of ICT for rich tasks and:
   i. use ICT for problem solving;
   ii. use ICT as knowledge-building tools;
   iii. use ICT to promote rich task collaborations;
   iv. use ICT to connect and align learning to rich tasks.

   Pre-service teachers were a catalyst for change, bringing what Rogers (1995) called the "critical mass" of innovation to participating schools, simultaneously reinventing the university, the practicum and school/university relations. Through collaborative effort resources are brought to existing projects in ways that build and extend community capacity.

g. The emergence of second and third generation ICT projects.

h. The emergence of new connected communities of practice.

i. The generation of more than $210,000 in community and school-based ICT funded projects.

Purpose of the project

NewBICTs is the acronym for the New Basics and ICT project, the centrepiece of which is the NewBICTs website (http://www.newbicts.com) — JCU School of Education portal aimed at providing a comprehensive online index of school and curriculum resources in the far north region of Queensland. At the heart of the NewBICTs site is an electronic action-learning data base and repository that can be used by pre-service teachers, teachers, university academics and teacher professional development providers to tie local ICT innovations and initiatives in schools more closely with learning, teaching and research programs within the School of Education JCU. Action-learning involves pre-service teachers taking a leadership role to improve the critical breadth, depth and application of ICT in student work. In this pilot project, collaborations between two clusters of schools, pre-service teachers, and university staff were geared to enable undergraduate teachers to be mentored through the project of "initiating innovation in ICT" while drawing on the expertise of school-based ICT champions. It was anticipated that the collaborative knowledge constructed by implementing this project would have the trickle-down effect of shaping the design of undergraduate and honours programs within the School of Education, and directly influencing the development of a regional blueprint for a (virtual) professional development college.

The project aims were:

- To provide pre-service teachers with a readiness to teach in ICT-rich schools and to have leadership capacity to use ICT in ways that match the intent of their host schools.
- To assist teachers in host schools to develop further knowledge of the purposes and applications ICT in the curriculum context and develop a deeper "buy-in" to using ICT more generally, given their experience or observation of ICT in a classroom context.
- To improve the capacity of the university program to meet the needs of pre-service teachers pursuing career goals in ICT-rich host schools.
- To develop a strong basis for the continuing development of a professional development college for educators with interest in integrating ICT into the curriculum of North Queensland schools.

The local research questions were:

1. To what extent can a virtual professional development college (schools, universities, government/non-government authorities) succeed in working together to achieve better ICT outcomes for learners in schools?
2. How is technological innovation "diffused" in schools?
3. What transformations are necessary for existing teaching/learning environments and practices to enable more effective ICT and innovation diffusion in schools?
4. What are the barriers and critical success factors affecting the diffusion of ICT in school settings?
5. Can pre-service teachers play a role in the diffusion of ICT such that more sustainable ICT-rich learning opportunities emerge?

Context

The project was based on the notion that computer networks are inherently social networks, linking people, organisations and knowledge into an integrated framework for everyday practice (Wellman, 2001). The global proliferation of distributed learning communities, particularly in education, points to a continued "de-emphasis" on what Wellman (2001) termed "group solidarities" in the work and community setting, pointing to greater opportunities for networked societies that are more "loosely bound" and sparsely knit. Hence the concept of a virtual professional development college.

In this case, ICT integration is the trend, and the schooling system is the focus for diffusion. This dynamic is captured in Figure 1. It shows the dynamic of the school population shifting from its current focus on local innovation and local champions, to a more "managed" focus encompassing knowledge sourcing, knowledge sharing, and knowledge dissemination between multiple partners at the classroom level. The idea suggests that, for good or bad, change can be promoted rather easily in a social system through a "domino effect". The tipping point idea finds its origins in diffusion theory, which is a set of generalisations regarding the typical spread of innovations within a social system (Rogers, 1995). Rogers termed this culmination of the efforts the "critical mass". This project is first and foremost concerned with creating the space for an ICT critical mass to form. The second focus of the project is to deliver to teachers, pre-service teachers, and schools, the toolkits to manage, develop and sustain innovative approaches to ICT-rich teaching and learning.

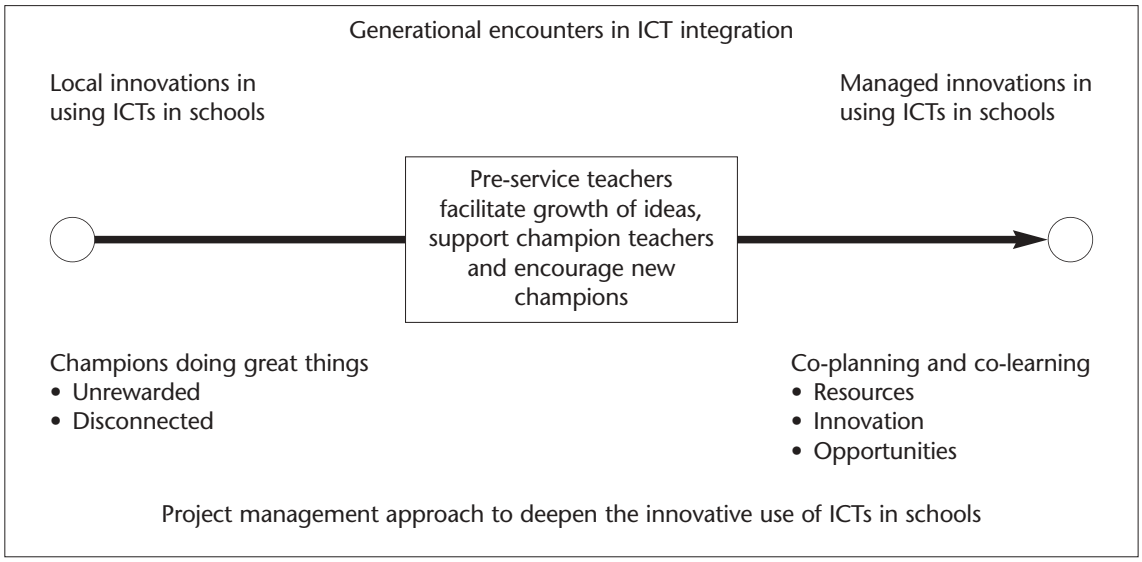


Figure 1. Contextualising the project

Partnership

Managing diffusion — a partnership model

The project partnership was built around the context established above, and the development of the NewBICTs website as an action-learning repository and expression of the virtual professional development college described earlier. Diffusion is the process by which an innovation is communicated over time through the managed channels of a social system, in this case the emerging professional development college. In this contrived partnership, we have manufactured relationships between university, pre-service and service teachers such that the diffusion of ICT curriculum practices is managed through the innovation-decision framework. In Figure 2, this partnership is presented as a managed process and strategy for five very important reasons. As Wellman (2001) points out, the de-emphasis on group solidarity within the ICT connected network means that decisions within such groups are not authoritative or collective in nature; each member of the system or network must construct his or her own innovation decision, and this process follows a "dance" of five well-documented steps. The innovation decision of one individual (be he or she pre-service, service or university teacher) depends heavily on the innovation decisions of the other members of the network. Within the context of this partnership, the principal research questions are embedded.

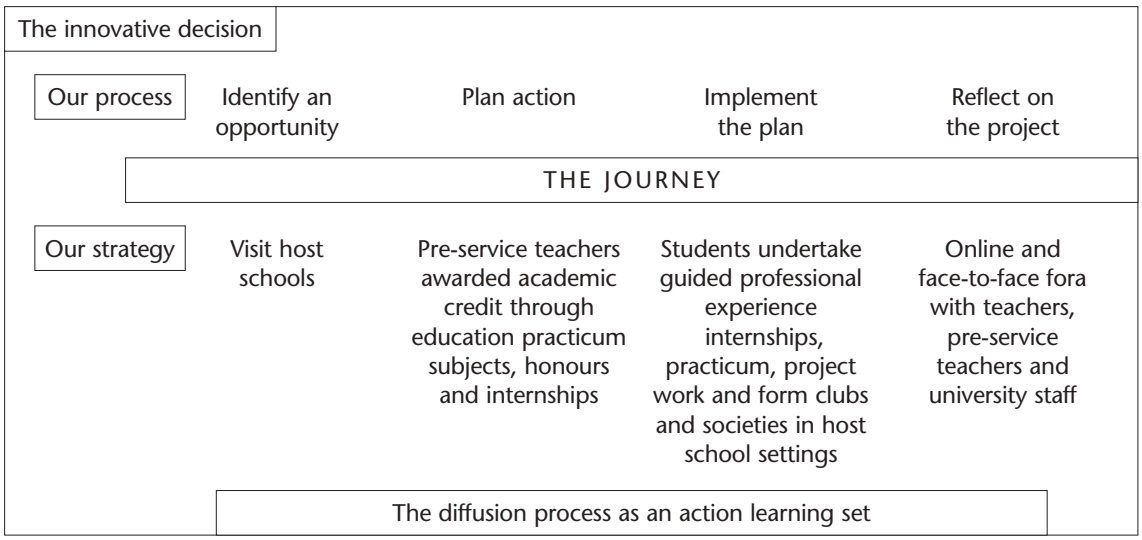


Figure 2. The partnership

The partnership is dynamic Figure 2 captures both the mechanism of diffusion and the nature of the partnership. Both process and strategy are interwoven. Visits to host schools culminate in the formation of local steering groups comprising pre-service and service teachers at each school site. Through action learning, pre-service and service teachers formulate ICT-integration strategies around rich tasks, implement this plan within the classroom setting, and reflect on the outcomes of their particular project. To support pre-service teachers, visits to host schools are encouraged, academic programs are constructed to support and guide pre-service teacher learning, and online repositories and discussions are a developed to identify the reflection process.

For pre-service teachers, the project constructed an action-learning model that:

- Used Cairns–based schools as a research base to identify strengths and gaps in teachers' current use of ICT in classrooms.
- Researched the contexts of remote and local schools using targeted seminars, online conversations and where practical, short site visits.
- Contributed to the development of the relationship between the university and the schools by co-designing teacher-generated tasks with teachers from schools and sharing these designs with university staff.
- Designed some professional-learning events for all participants to share the results of their collaboration through action-learning exchanges.

For participating schools, teachers undertook an action-learning program to enable them to progress their understanding of the opportunities to use ICT in curriculum programs by:

- Improving awareness of the opportunities to use ICT to improve the standard of student work.
- Learning new skills by co-teaching with pre-service teachers in an action-learning cycle.
- Reflecting on implementation.
- Contributing to the design of future teacher professional-learning programs and programs with pre-service teachers.

For university staff, this was an extended opportunity to participate in an action-learning program that:

- Used professional knowledge and evidenced-based research to inform pre-service teacher development.
- Involved visits to schools to gain an understanding of classroom implementation of ICT-rich teaching.
- Opened action-learning cycles to facilitate evidence-based research in ICT-rich settings.
- Enabled reflection on the impact of classroom projects on undergraduate programs.

Design of the project

Pre-service teachers

Pre-service teachers with ICT skill sets are considered people with "social capital" in a school setting. Their connection to ICT suggests new possibilities that enable them to step outside the rigid hierarchical apprenticeship of the traditional teaching practicum, towards a more inclusive model of professional induction. The pre-service teachers participating in this project were first, second, third and fourth year students of the School of Education at James Cook University in Cairns.

The practicum

Sixteen pre-service teachers took part in structured projects within the two participating schools of this study. Only four of the students undertook a formal practicum within the host school. The remaining 12 students elected to undertake an alternative approach to working with new basics schools in the form of an internship, or an independent project, or as structured volunteer work. In order to accommodate student needs, the School of Education opened pathways to the new basics project. It offered academic credit towards degree programs to those students who utilised the internship, the independent project, or structured volunteer work as a means of entering the NewBICTs project. In total, 40 students participated in the project, 16 of these in project partner schools.

Participating schools

School A is an inner-city primary school with a new basics mandate. Staff are currently engaged in integrating rich tasks and new basics across the curriculum. This school had approached the university with a request to partner them in their efforts to integrate more ICT into the rich tasks in Years 1 through to Year 7. Direct participation from eight teachers at the school was a feature of this relationship. These teachers worked under the umbrella of an ICT leader located within their school. They varied in exposure to ICT from little experience to an advanced level of experience.

School B is a remote P–12 secondary college, also dealing with the challenges of integrating rich tasks into the P–10 curriculum within a new basics framework. The challenge facing School B is exacerbated by the contingencies of remoteness, a high staff turnover rate, low levels of ICT capacity within the school (storage capacity of 600 GB) and high attrition and low retention rates amongst indigenous students. The challenge of remoteness is a compelling one. The information superhighway stops well south of School B, and the "world wide wait" commences. For this reason, staff investment in ICT uptake and diffusion was considerably lower than that at School A. In total, eight teachers participated in the NewBICTs project, ranging from teachers of Year 4 through to teachers of Year 12.

Implementation

Project coordinators met frequently with school staff at each of the two school sites. This recurring round of meetings culminated in establishing a steering committee for the project within each of the school sites. A project-management approach was adopted, with participating pre-service teachers linking to school-based teachers through the ICT leader of each school. The role of the ICT leader was to act as a catalyst, confidant, visionary, and organiser for each pre-service teacher and teacher pair. The focus of this model was very much on innovative partnerships, peer learning, organisational transformation, and incremental change.

Projects were identified within each school site and these were reported to the university in order to generate management processes and systems of support for participating pre-service teachers. Professional development activities in new basics and rich tasks were organised for participating pre-service teachers. Based on the scale of each individual pre-service teacher project, the pre-service teachers selected from a range of academic programs that which they deemed most enabling to support their individual project focus. Most students elected to undertake the NewBICTs project as an

independent study carrying the equivalent weight of one academic subject. Using the protocols of project management, the pre-service teachers worked through a project design, targeting processes, outcomes and timelines with each of their partner teachers. A corpus of 16 fully-partnered new basics and ICT initiatives was the result of this collaboration and planning.

Project participants — the 40 pre-service and 16 service teachers involved — were surveyed about key project issues in October and again in November. The 16 pre-service teachers and the 16 service teachers working in the partner schools were asked to complete an ICT innovators' peer-rating scale in December. The project methodology ranged from the macro issues affecting all 56 project participants and schools, to the micromanagement issues associated with innovation diffusion in schools, in particular to the 32 peer partners in the two specific schools. As this was a pilot project, it was decided that in view of the short timeline, the best outcome would be some insight into the macro issues around ICT integration facing schools, and the more difficult and challenging questions about how the micromanagement of ICT diffusion might lead to better learning outcomes for students.

The timeline for the project is summarised in Table 1 on the following page.

Data collection and analysis

The project proposes two discrete data sets. Data set 1 is an online and/or paper-based questionnaire targeting pre-service and partner service teachers participating in the project. The survey will examine a range of elements — *ICT integration strategy in schools, ICT staff development, ICT and you, "basics" leadership, the work environment and facilities*. The effective use of a questionnaire requires a clear understanding of the overall research context to ensure that "the initial and concluding stages of the survey are not independent; the survey structure must include all the facilities deemed to be necessary for successful analysis" (Youngman 1994, 248). The design of the survey instrument was guided by the following two criteria:

1. Consistency with the literature on effective integration of ICT in learning institutions. A review of the relevant literature identified elements considered important in integrating ICT in teaching and learning. Some of these elements are:
    - *Integration Strategy* (Mize & Gibbons, 2000).
    - *Leadership* (Mize & Gibbons, 2000).
    - *Staff development* (Holmes, Savage & Tangney, 2000).
    - *Work environment* (Mize & Gibbons, 2000).
    - *Facilities* (Holmes et al., 2000).

2. Applicability to contemporary notions of "deeper learning" as these relate to new basics and rich tasks. This includes consideration of the need to plan, implement and evaluate ICT enhanced learning programs, teaching and learning (curriculum), learning resources, the use of ICT to promote innovation, and the use of ICT to promote learning beyond the classroom.

Data set 2 comprises a second questionnaire examining the ICT innovations of participating pre-service and service teachers at the close of the pilot study. This was designed as an exit questionnaire and specifically addresses the five key research questions of the project (see above) in the context of ICT innovation.

Additional data will be collated from the project discussion forum and from interviews and focus discussions with participating school groups. The project web site, perhaps the key outcome of this action learning project, will also act as an archive and repository of school, teacher, pre-service teacher, ICT leader and university interactions. In this light it stands not only as an example of research outcomes, but can also be analysed as an artefact of the action-learning process itself. Quantitative methods will be applied to capture and bracket data categories (Data sets 1 and 2), while ethno-methodological steps will be used to interpret relations between sets.

Table 1. Project timeline and significant events

Research plan	Aug 2005	Sept 2005	Nov 2005	Feb 2006	Mar 2006	April 2006
Stage 1: Establishment • Partner schools established • Site visits • List of contacts created • School Projects Register developed • Project booklets issued • Test and validate survey • NewBICTs website team formed						
Stage 2: Liaison — Data set 1 • New Basics PD pre-service teacher • Establish baseline data • Map rich tasks in schools • Establish pre-service teacher academic programs • First round school meetings						
Stage 3: Implementation • Establish discussion forum • Conduct online orientation • Distribute entry survey • Commence website development • Liaise with ICT leaders • Site visits						
Stage 4: Focusing — Data sets 2 and 3 • Coordinator develop interview schedule • Conduct interviews/surveys/ratings • Data capture/bracket • Prepare transcripts • Thematic analysis — case data • Dissemination and reflection • Website development by themes • Student and school debrief						
Stage 5: Realisation • Triangulation: Data sets 1/2 and ratings • Case development • Lighthouse and exemplar profiles • Website trial/review • Revisioning — future planning • Contingency/ sustainability planning • Disseminating results						
Stage 6: Reporting outcomes • Dissemination of results, models and findings • Reporting and compliance						

Results and discussion

Perceptions of the NewBICTs process: Level one — satisfaction

This discussion of results offers four levels of evaluation of project outcomes based on those developed by Kirkpatrick (1996). This classification scheme is offered as a framework for evaluating enterprise-learning programs such as the "virtual" professional college, and for determining the effectiveness of the NewBICTs project on participating schools and the learning of pre-service teachers. Both teachers and pre-service teachers were asked to respond to five statements related to their understanding of the NewBICTs project and their assessment of "NewBICTs peers" as partners in innovation. Responses were rated on a five point scale ranging from 1 = strongly agree to 5 = strongly disagree. Results of a statistical breakdown of all responses (n = 33) are shown in Table 2.

Table 2. Responses to NewBICTs project (n = 33)

Item	Mean	SD
1. I understand the aims of the NewBICTs project	1.80	0.85
2. I believe NewBICTs is an innovative vehicle for ICT	2.05	0.92
3. I am confident in the action-learning model	2.10	1.05
4. The NewBICTs project is a learning opportunity	2.20	1.05
5. I can contribute to NewBICTs as an equal	2.30	1.08

Across the total NewBICTs population the results (Table 2) reflect an approximate level of agreement, and a "narrow" distribution of values (mean SD approaching 1). This is a reasonably positive endorsement of the NewBICTs project by participants.

Level two evaluation: What was learned?

Level two evaluation tests participant learning (Kirkpatrick, 1996) and generally takes the shape of an evaluation of "what was learned". The leverage of social relationships (within the NewBICTs community) was designed to maximise pre-service and service teacher engagement through action-learning around ICT. In this way learning becomes the enterprise of the total network. In a practical sense, this meant:

1. The community activities set around the NewBICTs project required mutual engagement with other pre-service teachers, teachers, university staff and host school curricula.
2. The designated ICT focus challenged pre-service and service teacher frameworks, yet provoked them to explore new terrain within their collaborative teaching. The action-learning component lent itself well to mentoring practices, hence the involvement of pre-service teachers with ICT skills, ICT champions in host schools and academic mentors from the university.
3. The cycle of learning was continuous. Participants were able to build a commitment to each other and to NewBICTs as an organising resource for this networked community.

Through ICT teachers and pre-service teachers became resources for learning in much more complex ways — they enabled teaching, learning and evidence-based research to interact so that each became a structuring resource for the other.

The next section documents how pre-service teacher and teacher roles "evolved" through the interaction, exchange, and reflective opportunities the project offered.

Level three evaluation serves as a check to see if the ICT skills base underlying the NewBICTs project is actually being accessed and used by participating teachers and pre-service teachers (Kirkpatrick, 1996). Items 1–22 were completed using a five-point peer-rating scale (see below). These items were designed to address five key areas:

- ICT Variety and Use (items 1–5)
- ICT and Curriculum Integration (items 6–9)
- ICT and Curriculum Embeddedness (items 10–14)
- ICT and Curriculum Alignment (items 15–19)
- ICT and Attitudinal Effects (items 20–22)

Data detailed here feature a convenience sample of 33 respondents (17 pre-service teacher and 16 current-service teachers) presented as frequencies and percentages (Table 3). Some participants elected not to respond on specific items (i.e., 9, 13, 14, 15, 16, 18, 19, 20 & 22). Some points warrant mention. Cross-group comparisons show that a significant (with Bonferroni adjusted $\alpha = .01$) number of participants scored high peer ratings for ICT Variety and Use ($M = 3.47$, $SD = 1.17$), $t(18) = 12.92$, $p < .01$ (95% scoring between 2.91 and 4.04). The same generally high peer rating occurred for peer-ratings on ICT and Curriculum Integration items ($M = 3.50$, $SD = 1.16$), $t(15) = 12.12$, $p < .01$ (95% scoring between 2.88 and 4.12); ICT and Curriculum Embeddedness items ($M = 3.67$, $SD = 1.09$), $t(17) = 14.34$, $p < .01$ (95% scoring between 3.13 and 4.21); ICT and Curriculum Alignment items ($M = 3.71$, $SD = 1.11$), $t(16) = 13.83$, $p < .01$ (95% scoring between 3.14 and 4.27), and also in terms of ICT and Attitudinal Effects ($M = 3.64$, $SD = 1.12$), $t(10) = 10.78$, $p < .01$ (95% scoring between 2.88 and 4.39). In other words, the vast majority of participants in this study, be they pre-service or current service teachers, performed at least "average" in all categories of ICT practices in the eyes of their ICT-savvy peers, with the performance usually leaning towards "above average". This is a compelling endorsement for pre-service teacher ICT practices and a powerful acknowledgement of the ICT practices of current service teachers.

Level three evaluation: Was the learning being used?

Table 3. Frequencies and percentages of items in the ICT rating scale

Item	Not applicable		Never		Some-times		Often		Very often		Non res-pondents	
	N	%	N	%	N	%	N	%	N	%	N	%
1. X used ICT in new and different ways	2	6.1	3	9.1	5	15.2	10	30.3	13	39.4	0	0.0
2. X was often in the "learner" role with ICT	2	6.1	2	6.1	13	39.4	0	0.0	16	48.5	0	0.0
3. X's students used ICT as tools of production	2	6.1	1	3.0	5	15.2	13	39.4	12	36.4	0	0.0
4. X did something innovative with ICTs	2	6.1	1	3.0	2	6.1	11	33.3	17	51.5	0	0.0
5. X acted as an ICT leader in this school	10	30.3	1	3.0	2	6.1	7	21.2	13	39.4	0	0.0
6. X incorporated ICT into curriculum planning	2	6.1	1	3.0	5	15.2	12	36.4	13	39.4	0	0.0
7. X used ICT to reconceptualise tualise the curriculum	0	0.0	3	9.1	8	24.2	11	33.3	11	33.3	0	0.0
8. X used ICT to achieve new learning outcomes	1	3.0	2	6.1	7	21.2	7	21.2	16	48.5	0	0.0

continued over

Item	Not applicable		Never		Some-times		Often		Very often		Non res-pondents	
	N	%	N	%	N	%	N	%	N	%	N	%
9. X used ICT to make learning time effective and efficient	7	21.2	1	3.0	5	15.2	13	39.4	5	15.2	2	6.1
10. X used ICT to increase learner understanding	4	12.1	1	3.0	6	18.2	13	39.4	9	27.3	0	0.0
11. X used ICT to develop multiliteracy	3	9.1	0	0.0	5	15.2	20	60.6	5	15.2	0	0.0
12. X used ICT rich tasks to measure student understanding	7	21.2	3	9.1	5	15.2	13	39.4	5	15.2	0	0.0
13. X used ICT to coordinate learning tasks	18	54.5	0	0.0	1	3.0	10	30.3	2	6.1	2	6.1
14. X used ICT as the basis for authentic learning tasks	5	15.2	1	3.0	8	24.2	9	27.3	9	27.3	1	3.0
15. X used ICT to integrate curriculum areas	1	3.0	1	3.0	5	15.2	14	42.4	9	27.3	3	9.1
16. X used portfolios to profile student learning outcomes	17	51.5	0	0.0	0	0.0	9	27.3	4	12.1	3	9.1
17. X used ICT to structure student enquiry	1	3.0	2	6.1	4	12.1	12	36.4	14	42.4	0	0.0
18. X used ICT to template student literacy	2	6.1	0	0.0	4	12.1	11	33.3	15	45.5	1	3.0
19. Students in X's class used ICT as interpretative tools	11	33.3	1	3.0	2	6.1	4	12.1	13	39.4	2	6.1
20. X used ICT to support teacher collaborations	1	3.0	2	6.1	6	18.2	15	45.5	8	24.2	1	3.0
21. X should use more ICT in their teaching	2	6.1	0	0.0	4	12.1	16	48.5	11	33.3	0	0.0
22. X was more an ICT mentor than a mentee	3	9.1	1	3.0	4	12.1	16	48.5	7	21.2	2	6.1

In fact, in direct comparison, the current service teacher population went on to rate the pre-service teachers as "more ICT savvy" than they were themselves (Table 4) when teaching a "rich task". Table 4 documents current service teacher self and pre-service teacher (PST) ratings in ICT use and application across several domains. The five domains presented returned a significant result (t-test application).

Table 4. "Current" and "PST" means for teachers' confidence levels when teaching students how to use ICT

ICT focus	Self-rating mean	PST rating mean	Significant difference
ICT uptake and innovation	2.65	3.41	.001*
ICT for problem solving	2.59	3.47	.000*
ICT as knowledge tools	2.24	2.88	.000*
ICT to build collaboration	2.29	3.12	.001*
Connects ICT to rich tasks	2.41	3.29	.000*

Current service teachers rate pre-service teachers as more innovative in ICT usage and classroom uptake (M = 2.65, SE = .191, t(16) = -4.19, p<.05). In terms of ICT use for problem solving, current service teachers saw pre-service teachers as having an edge over them in how ICT is applied to rich tasks to promote problem solving (M = 2.59, SE = .193, t(16) = -5.22, p<.05). Further, pre-service teachers were deemed to be more able than current classroom teachers to integrate ICT as knowledge tools in a rich task setting (M = 2.24, SE = .208, t(16) = -4.40, p<.05). This same sense of capacity extended to the use of ICT to build collaborative learning in rich task classrooms, with current service teachers again reporting that pre-service teachers held an edge (M = 2.29, SE = .223, t(16) = -4.20, p<.05) in building collaborative efforts in rich task assessment. Current service teachers were also asked to rate pre-service teachers in terms of how they connect ICT to rich tasks. They reported that pre-service teachers seemed to have an intuitive sense of how this connection may look, feel and operate in a rich task classroom (M = 2.41, SE = .150, t(16) = -5.22, p<.05). All in all, current service teachers report that pre-service teachers were able to point to more apparent ICT-rich learning encounters for students within the context of developing and teaching a rich task.

Level four evaluation — can the learning be sustained?

The design and development of the *NewBICTs* portal gives the networked NewBICTs community their own localism, their own regimes of competence, and even (in the case of ongoing projects) their own generational encounters. Converging ICT practices established a warrant for continued exchange and collaborations. There was a strong consensus amongst the sample that ICT needed to be used in new and different ways (72%); that ICT was a tool of production not reproduction (76%); that innovation was important (84%); that ICT can be used for curriculum planning (75%); curriculum integration (70%); to teach multiliteracy (76%); to structure student enquiry (79%); and to model literacy practices (79%). An important aside to these findings is that despite the high acknowledgement of "innovative ICT practices" evident amongst the sample, peer-raters reported that some 82% of participating pre-service and current service teachers could use "more ICT in their teaching".

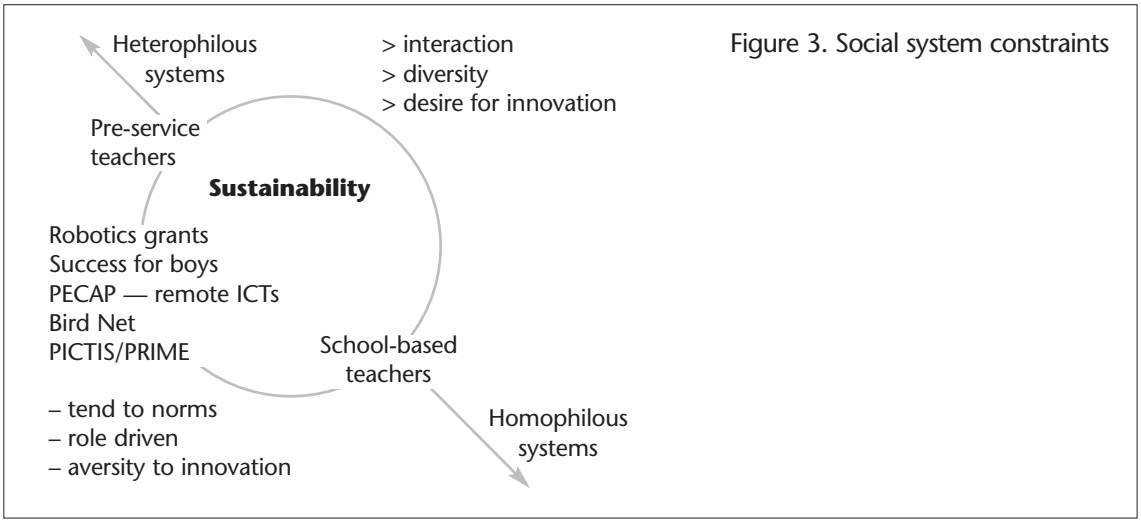


Figure 3. Social system constraints

At the core of the collaboration is an awareness that the short-term spread of innovation follows what Rogers (1995, p. 23) called a classical S-shaped curve. After early adopters like our pre-service and service teachers have begun "pushing" ICT innovations in schools, there will be a period of rapid recruitment to new innovations before a plateau, in which more resistant network members will consider their options. This kind of referent is crucial to the act of evidence-based research. How do we know that better ICT outcomes are being achieved in a system that equates increased traffic with increased learning? This last point is important. In mapping a new, loosely coupled, loosely knit and somewhat ambiguous collaboration such as this, where pre-service teachers have a different, but nonetheless valuable social capital, we need to take account of the "nature" of institutions.

In Rogers' (1995, pp. 289–296) terms, schools and universities straddle the dual platforms of the "heterophilous and homophilous system" (Figure 3). For example, the heterophilous system is a "type", and its bias is towards high levels of interaction, great diversity of input, and an essential leaning towards innovation (the university). The homophilous system is less organically structured, is norm-oriented, rule-driven, and averse to most innovation (the school). It is the norms of the classroom and of the school that dictate ICT practices in the homophilous school system. While this doesn't characterise every school, it serves as an adequate description of most, and points to the difficulty schools face in introducing innovations. It also highlights the need for strategic ICT planning at the school level in order to sustain innovation and draw on the best of both "worlds".

It is no surprise then, that schools are not the hot bed of ICT innovation we may conceive them to be. In fact, the NewBICTs project highlights the need for "communities of practice" to rally around the school sector, to create the impetus and context of "real ICT integration" within an established community of origin. The NewBICTs project is an entrepreneurial catalyst. Since its inception members of the NewBICTs collaboration have secured $80,000 in Priority Country Area Program funding for remote area ICT student placements, and an additional $9600 in tagged PECAP funding in one school alone. NewBICTs pre-service teachers are also working in the $80,000 Bird Net Project in the Northern Cape region, the SOTO Science Project ($70,000) in Cairns, and a Northern Beaches school cluster project featuring Boys and ICT ($53,000). While all this is happening, they await the results of existing *Robotics* and *Techxperts* grant applications to "drive" the next wave of ICT innovations in the region. The number of pre-service teachers involved in New Basics school placements has increased by more than 100% — up from 16 to more than 40. In addition to this, the NewBICTs project will have four students completing honours theses in local schools, based on studies of ICT integration in 2006, along with 27 students engaged in school-based internships in ICT-rich schools. University programs, as well as school-based practices have begun to mirror the emerging demands of the professional development college.

Conclusions and recommendations

The five local research questions posed at the outset are addressed below.

1. To what extent can a virtual professional development college (schools, universities, government/non-government authorities) succeed in working together to achieve better ICT outcomes for learners in schools?

   Although still at an early stage, it seems clear that the NewBICTs project has opened possibilities for pre-service teachers to influence the strategic uptake of ICT at the school level. A virtual PD college can draw on schools, universities and pre-service teachers to connect to already-existing communities of practice, challenging the accepted practices and relations of each.

2. How is technological innovation "diffused" in schools?

   At the individual level, the innovation decision is made through a cost benefit analysis, where the major obstacle is uncertainty. When dealing with three clear and distinct cohorts of people, managing expectations of the diffusion journey is an important process. For example, for each participating school is ICT compatible with the existing classroom habits and the values of participating teachers? Do classroom conditions allow for easy adoption of ICT? Will this innovation create more uncertainty for classroom practitioners? In bringing together diffusion as both a process and a strategy, we need to address and reduce aspects of uncertainty. Schools, pre-service teachers and universities need to be able to get something out of their "diffusion investment". This means there is a need to reconsider the role of the practicum as the key interface between schools, universities and pre-service teachers.

3. What transformations are necessary for existing teaching/learning environments and practices to enable more effective ICT and innovation diffusion in schools?

   In this pilot project, collaborations between two clusters of schools, pre-service teachers, and university staff were geared to enable undergraduate teachers to be mentored through the project of "initiating innovation in ICT" while drawing on the expertise of school-based ICT champions. As anticipated, the collaborative knowledge constructed by implementing this project had the "trickle-down" effect of shaping the design of ICT programs in the region, ICT practices in schools and redefining undergraduate and honors programs within the School of Education This culminated in the development of a regional blueprint for a (virtual) professional development college. Continued exploration of new models for collaboration are recommended, in particular moving beyond a traditional view of how the tri-partite relationship between schools, universities and pre-service teachers is formed.

4. What are the barriers and critical success factors affecting the diffusion of ICT in school settings?

   The NewBICTs project highlights the need for "communities of practice" to rally around the school sector, and to create the impetus and context of "real ICT integration" within an established community. The diffusion decision is a complex process, shown here to involve individuals dealing with uncertainty, change and sustainability challenges.

5. Can pre-service teachers play a role in the diffusion of ICT such that more sustainable ICT-rich learning opportunities emerge?

   In this study, pre-service teachers were a catalyst for change, bringing what Rogers (1995) called the "critical mass" of innovation to participating schools, and reinventing the university at the same time (Figure 4). Pre-service teachers were considered more innovative, more sustained, more connected to curricula, more developmental and more collaborative than current service teachers in their use of ICT for rich tasks. Through collaborative effort in this project resources were brought to existing efforts in ways that built and extended community capacity. The result was a form of school and community renewal (Figure 4) built on informed evidence-based research. The project also reported a great deal of convergent thinking between pre-service and school-based teachers about the current and potential applications of ICT in schools. Findings here suggest that thinking about ICT in schools has progressed way beyond thinking about technology in isolation. ICT is deeply connected to curriculum purpose, curriculum innovation, curriculum integration, curriculum planning, and mental modelling processes.

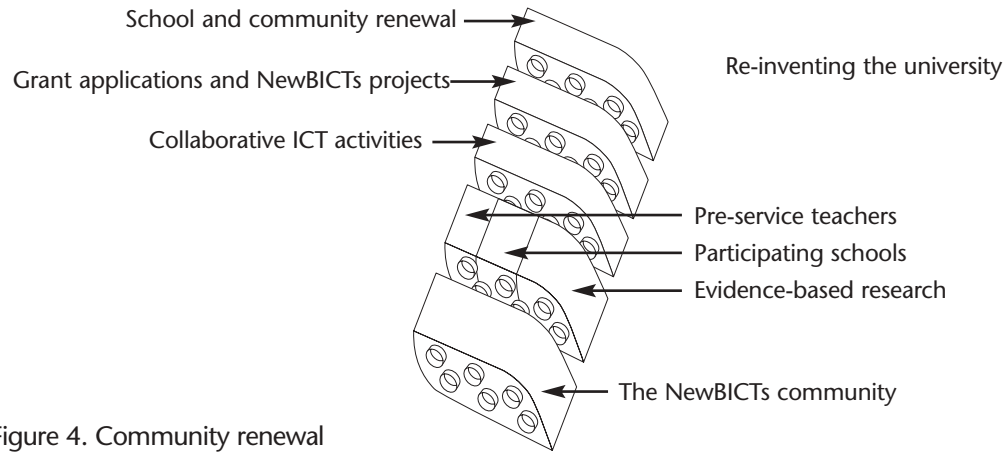


Figure 4. Community renewal

References

Holmes, B. Savage, T. & Tangney, B. (2000). *Innovation in Learning in the Information Society: A Comparative International Study*. Accessed March 2003 at http://odtl.dcu.ie/mirror/crite/CRITEfinal.html

Kirkpatrick, D. (1996). Revisiting Kirkpatrick's Four-Level-Model. *Training & Development*, vol. 1. pp. 54–57.

Mize, C.D. & Gibbons, A. (2000). *More than Inventory: Effective integration of IT to support student learning in K–12 schools*. Accessed 20 August 2004 at www.editlib.org/index.cfm?fuseaction=Reader.ViewAbstract&paper_id=15928

Rogers, E. (1995). *Diffusion of Innovations*. 4th edition. New York: The Free Press.

Wellman, B. (2001). Computer Networks as Social Networks. *Science*, vol. 293, pp. 2031–2034.

Youngman, M.B. (1994). 'Designing and Using Questionnaires', in Bennett, N., Glatter, R. & Levacic, R. (eds), *Improving Educational Management through Research and Consultancy*. London: The Open University Press, (pp. 248–266).

Stories in ICT professional development

REPORT FROM THE VICTORIA PROJECT

Sue McNamara, Australian Catholic University National
Mellita Jones, Australian Catholic University National
Karen McLean, Australian Catholic University National

Executive summary

Set in the context of regional Victorian education and embracing university staff, practising classroom teachers and pre-service teachers, the Victorian project component of this national undertaking adopted an holistic approach to the exploration of partnership. The project focused on investigating deeper understanding rather than broader superficial skilling. The two criteria of the national project, quality and sustainability, have commonly been interpreted in the guise of providing minimal skill-based-only assistance at the cheapest financial cost to large numbers of pre-service or practising teachers in a "just-in-time" configuration. This project focused on questions of deeper transformation — exploring the beginnings of how teachers and pre-service teachers might fundamentally change their perceptions of, and consequent interactions with learning technologies for sustainable and quality learning

Despite pockets of innovative mindsets, it can be suggested that in general, teachers continue to see ever-improving technological functionality as merely "yet another add-on" in the realm of classroom teaching practice requirements. Technology is largely not perceived as integral to a teacher's "thinking" and actions.

Participation in this project involved embarking on a journey designed to expand teachers' (and pre-service teachers') knowledge, understanding and consequent skills in information and communication technology in education in ways in which the teachers (and pre-service teachers) selected for themselves and thus formed ownership of their learning. In the longer-term, though not possible to examine within the limited confines of the present study, it is anticipated that the participants themselves might eventually become facilitators of colleagues' development in an ongoing and sustainable manner.

The project applied a model which emphasised the *human aspects* of working with technology, and the empowerment of practising teachers and pre-service teachers as individuals and as members of a partnership. The holistic model was viewed as fundamental to the deeper learning and on-going motivation of teachers to continue to explore and develop the ICT domains of teaching and learning beyond the concreteness of the project.

In this study "the project" was embraced as a space where all outcomes were considered as valuable learning. "Success" was defined by the individual and the partnership, rather than by specified project outcomes. The project was viewed as a pilot step in a much larger undertaking, rather than an extremely time constrained testing of a "solution" to a problem.

The depth of quality of the learning generated by the model was notable. Confidence and motivation gained from conversation and the journey of implementation were two key findings of the study. Deeper understanding of the complexity and possibilities of technology was found in the reflections of most of the practising teachers and pre-service teachers involved. Most participants saw their work as continuing well beyond the project because they could now see, pedagogically, a natural place for ICT in their everyday teaching and learning approaches.

Sustainability remains a question to be answered on a larger scale over a longer period. The approach and strategies within this project concentrated on small intense partnerships. Further investigation into associated scaffolding which would allow for the same level of depth in large groups would be needed. If, however, the notion of quality in partnerships for ICT is about deep learning rather than superficial short-term skills provision and "sustainable" beyond the boundaries of a limited time frame of an extremely short "project" period, then it is suggested that the model applied in this project is worthy of much further consideration and exploration.

Purpose of the project

Whilst the sales pitch of technology in education always makes it seem simple and easy, teaching effectively with technology is a rather sophisticated undertaking. Moreover, whilst the "marketing hype" often portrays new developments as the solution to every problem "at the touch of a button", it can be argued that the representation of human involvement with technology in education cannot be appropriately characterised by a single entity. Schrum and Glassett (2006) have found few examples of systemic increases in student learning and achievement which might be attributed to technological innovation or enhancement, despite more than 20 years of technology implementation in schools. It would seem that the complexity of system-wide change needs more than simply a skill base extension (Kurtz & Snowden, 2003). Rather, the realisation of the potential of technology in education may require the encouragement of a fundamental transformation (Warner, 2006) of teachers' thinking, knowledge, understanding of, and skills in ICT. Further, it would appear that such transformation cannot best be framed within traditional professional development and curriculum training approaches.

This project was a journey expanding participants' knowledge, understanding and skills with a view to changing thinking and mindset. The project considered in particular two dimensions of transformation. The first was the nature of collaboration and partnership; the second was a pedagogical focus on how technology might be embraced in a teacher's thinking. In particular, the project first explored an adaptation of an holistic model which emphasises the human aspects of working together; and then empowerment as individuals and as members of a partnership.

Context

Teachers are creatures of diversity and complexity, having different learning styles, different aptitudes and abilities, different cultures, lifestyles, social and cultural contexts and thus differing encounters with technology in education. Several researchers such as Fullan (2001) have noted the difficulties in changing educational practice. Fullan (2001) characterised three stages in the change process: adoption or initiation, implementation and institutionalisation or continuation. The current project would be situated within the initiation or adoption stage. The achievement of transition from a superficial, relatively passive, transmissive skills-based approach to technology, to one of an all-encompassing deeper way of thinking and "doing" teaching with technology requires comprehensive multi-level, multi-dimensional, longitudinal encounters. What is needed is an approach which can capture the depth and intensity of the educational engagement with technology and use it to initiate and nurture the changes. In order to encourage the adoption of technology in education to reach its true potential, educators need to know the whole story. And in a small part this project sought to write an introductory chapter to such a story of transformation.

Some definitions

Several definitions, some with interpretations different from the "national" perspective of this study, were applied in this project.

Partnership — as seen through the eyes of this project was defined as the "equal" association of practising teachers with pre-service teachers in a joint effort to explore and expand each individual's thinking, understanding, knowledge and skills in ICT in education.

*Quality** — as seen through the eyes of this project was related to the manner in which the partnership developed and more importantly, to the depth of thinking, knowledge, understanding and skills acquired or developed in the process of moving towards transformation or perceived by individuals and partnerships as developing.

* It should perhaps be noted here that whilst this project team "grappled" with the definition of what was meant by quality in this project, conversations with the project officer indicated that although the term appeared in the project brief, it was not of particular importance to the project because it was considered largely a transient entity.

Sustainability — as seen through the eyes of this project related to those elements of the project which might be replicated, altered, expanded, or to which scaffolding might be added in a larger, more longitudinal study to further develop the model of practice.

Holistic — The theory and methodology of the project and the underpinning of the adapted model employed in operationalising the project encompassed consideration of teachers' and pre-service teachers' philosophies of technology in education, differing levels of interest, expertise and perspectives. Moreover, it placed technology as a fundamental, inclusive educational tool rather than as an additional component to classroom culture and practice.

Success — was considered as involvement. It was denoted as the realisation of new thinking, knowledge, understanding, or skills relating to technology and/or partnerships in the learning. Success was not "quantified" but rather was characterised by such entities as the richness of the description of the experience, the intensity of the experience, the depth and extent of the reflection and its position in the overall perspective of the participant(s).

Transformation — was considered as the equivalent of a reported fundamental change in the approaches to teaching and learning with technology that participants might demonstrate through their stories.

Partnership

The partnership involved university teacher educators (the researchers), and pre-service teachers partnering with practising teachers. Systemically it involved the four partners of the university, Catholic Education Office, Ballarat, Department of Education and Training, Victoria and the individual schools who gave teachers permission to join the project.

The researchers planned the project and workshops which provided the scaffolding for the project and which were designed to establish the sharing of story. They also formed a pivotal point to the schools, monitoring each partnership as a form of support to the participants during the period of that data collection/project implementation. Each researcher brought a different perspective and research background — from qualitative to quantitative perspectives — to the group.

The partnerships were formed in the initial workshop. Project participants then contributed to discussions, interviews and conversations within and between groups on how they felt they were progressing, the nature of ICT being used, any learning they felt was occurring for themselves and/or for the children in their classes (with respect to ICT) and what their experience of the partnership model was like.

Pre-service teacher participants comprised a small number of volunteers from among third and fourth year under-graduate and graduate Bachelor of Education students from the university. With the permission and assistance of the principals, practising teachers were drawn from the local Catholic and state primary school community. For neither pre-service nor practising teachers was there any object incentive (e.g., credit in the pre-service course or payments for teachers) to being a part of the study. Participation was solely determined by interest.

Neither pre-service teachers nor practising teachers were selected for their "advanced" knowledge, skills and understanding of ICT. Rather, participants were representative of a range of levels of knowledge, skills and understanding in ICT and this configuration was also characteristic of volunteer participants. One or two participants considered that they had considerable skills. If not deep understanding and knowledge, some thought their expertise medium and a few considered themselves closer to novice level. A total of five teams were formed, each consisting of two, three or four teachers and one to three pre-service teachers with a teacher educator as a critical friend to the partnership — and researcher — on the journey.

Project design

Objectives

We began the project with the following objectives:

- To explore partnership and collaboration for quality and sustainability through the development of stories based on the use of an holistic, human-centred model of reflective, experiential-based learning.
- To strengthen the thinking, knowledge, understanding and resulting use of technology in learning by teachers, from a pedagogical perspective, within the framework of the Victorian Essential Learning Standards (VELS) curriculum framework.

Severe time constraints and practical limitations in the national framework of this study meant this project focused on *teacher* perspectives and dimensions, and not on direct objectives relating to "student learning". Student success was seen as a future outcome, in keeping with the work of Fullan (2001 and Schrum & Glassett, 2006), as being derived from the successful development of teacher practice which would, in turn, facilitate student objectives and outcomes.

The Project model

The project design was based on the human-centred, reflective-action model developed by Howard & Walsh (2005) and implemented in the production of the multimedia package *Mercy and Justice Shall Meet* (Figure 1) and adapted, with permission, for this project.

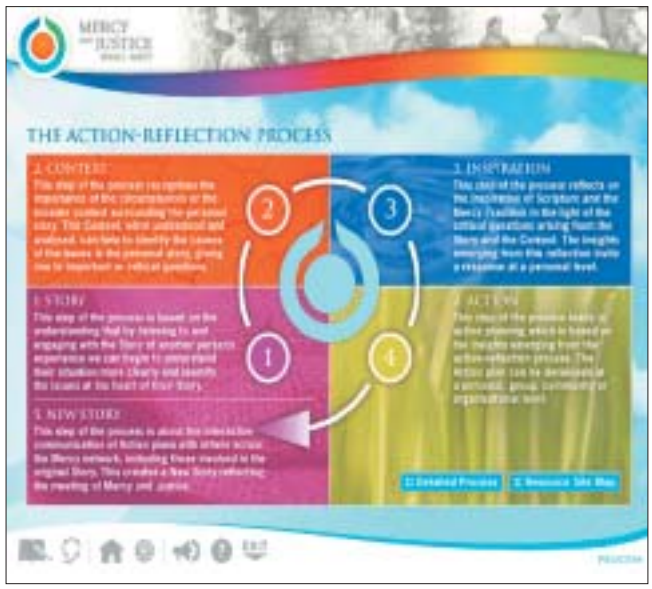
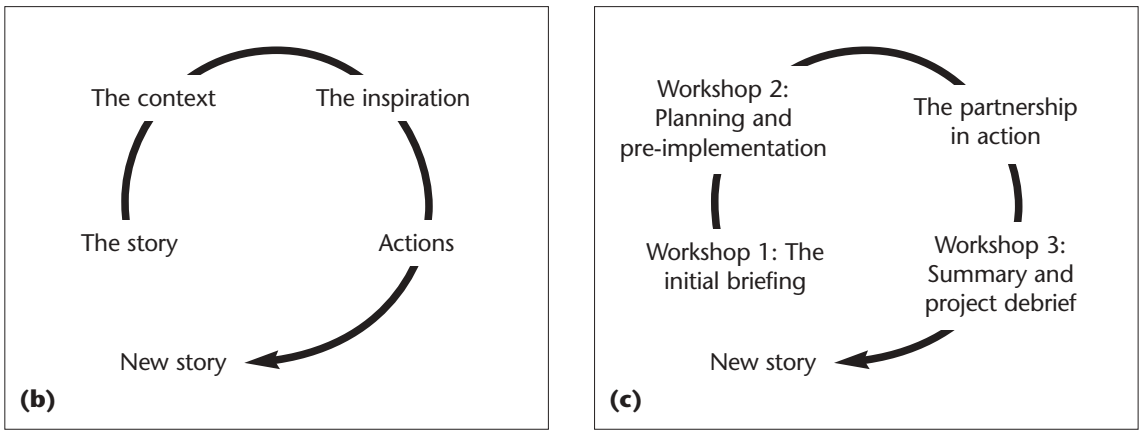


Figure 1. (a) The model as presented in its original form



(b) The major components of the model. (c) The model as it was operationalised in this project.
Screen captured, with permission, from "Mercy & Justice Shall Meet" — CD produced by Fraynework: Digital Storytelling (Howard & Walsh 2005)

In addressing transformation the model adopts a spiral representation of contemplation through story or narrative. The journey begins with a story, in our case one of teaching with technology. This was shared by all participants in the first workshop, where individual philosophies of technology in education were recorded. Based on the original story the model then explores the Context for developing a new story, in this project the building of partnership and collaboration for a particular purpose. This dimension formed the focus of the second workshop. The next element in the spiral is the Inspiration. This was translated in the present project as paralleling the exploration of the potential of partnership in the design and development of the ICT projects. The Action was the implementation of the projects within the schools. The new story was represented in the findings of the stories of individual partnerships, in the story of the project as an entity and the new beginnings for each of the participants involved. The adaptation of the model incorporates consideration of other authors such as Korthagen (2001), whose work has also centred on action-learning models.

Constraints

Time constraints posed a significant problem in the project. One of the endeavours of the project was to frame it within normal school timetables and curriculum programming. However, as Victoria hosted the 2006 Commonwealth Games in March of 2006, school terms for the year were modified to accommodate the timing of the games. Thus, the first school term was a very brief six weeks duration. As the initial project report had to be drafted by March, time constraints allowed only six weeks opportunity in which the project implementation stage could take place. The time constraints however, were seen in a positive light by at least one project participant. For this participant they were seen as a means of containing the particular work done and ensuring the children had a visible outcome from the partnership for that particular project.

The constraint of extremely limited time was further exacerbated by the pressures of curriculum and assessment reporting changes being enforced in Victorian Catholic and state schools. The implementation of the new assessment reporting procedures was mandated by government for Catholic schools, although optional for state schools at that time. At the same time all schools were required to implement the new Victorian Essential Learning Standards (VELS) curriculum framework. Teachers were thus feeling significant pressure and stress before they even volunteered to take part in the project. The voluntary participation of teachers under such conditions is surely an acknowledgment of their professionalism. Whilst an additional focus on ICT could not be expected to be a priority for teachers under such circumstances, those involved nevertheless enthusiastically embraced and shaped the project, despite the other pressures on them.

Methodology

The project methodology employed a number of workshops, partnership projects and data-collection tools including survey materials, participant journals, multimedia reports and final presentations, interwoven with the development of collaborative partnerships, the formulation of individual project briefs and the implementation of the project briefs. Each of the workshops was designed to build progressively on the strengths of the individuals involved. Prior to commencement of the intensive component of the project, appropriate permissions and ethical clearances were sought and received from each of the organisations and individuals involved. Timelines for the various phases of the project, design of the workshop series and the materials to be used in the project were completed.

The project commenced in early December 2005 with the first workshop — the initial briefing. The second briefing preceded the period of implementation of the individual projects in the schools in February 2006 with the final, formal debriefing occurring early in the second Victorian school term in March.

The initial survey

Prior to working with the practising teachers pre-service teachers' perceptions of technology in education were explored through the use of a survey distributed to Bachelor of Education students. The survey collected data relating to three key areas. The first focused on the identification of what constituted, in the respondent's mind, examples of ICT in the classroom and school environment. The second considered the use of ICT in schools, for example, where, when and how participants have seen/been involved in ICT use in teaching and learning and their opinion of its effectiveness. The third and final area of the survey focused on attitudes and opinions towards using a partnership between pre-service and practising teachers as a model for learning.

Workshop 1: The initial briefing

The first workshop, a full day briefing for all participants, began with an introduction to the project and personal introductions to all participants. The next activity, reflective thinking, sought to elicit the teachers' understandings of, expertise in and attitudes towards technology in education.

As a part of their self-reflection, practising teachers also completed the survey (previously completed by pre-service teachers) designed to identify current understandings and observations of ICT in education. The research team also collected participants' writings about their philosophies regarding technology in education at this time. Following the self-reflection, the participants told their stories about how they had experienced ICT in their own professional practice — either as a practising or a pre-service teacher. The finale to this "through the looking glass session" was a discussion and brainstorming by the participants on the possibilities of using ICT in the classroom as their project.

Lunch, often seen as just a breathing space, but unimportant activity of workshops, was used as a most important initial conversation opportunity. Lunch was more than an "icebreaker" or a breathing space. It proved to be both a time and space where "professionals" came together initially — not as teachers and pre-service teachers. The effect of "lunch" was noted in the final evaluations two months later where participants made an active note of the "great lunch" and explained their meaning!

The final session of this workshop introduced participants to the model for the project, to the cyclical process and to the planning booklet which was provided for them to record their reflections during the course of their particular project.

Workshop 2: The pre-implementation briefing

This workshop launched the implementation phase of the project. Over the intervening Christmas holiday period the partnerships had worked informally, meeting in their own times, at their convenience, thinking and planning. This half-day session provided the opportunity for participants to clarify, streamline, update and finalise their plans for meeting, reflecting and planning during the six week implementation period. This workshop also introduced the website (Figure 2) developed as a support tool for the partnerships "in the field".

Over the period of implementation each of the researchers maintained contact with the various partnerships. Visits, interviews, informal meetings, multimedia recorded meetings and report sessions provided observational and journal information from this stage of the project.

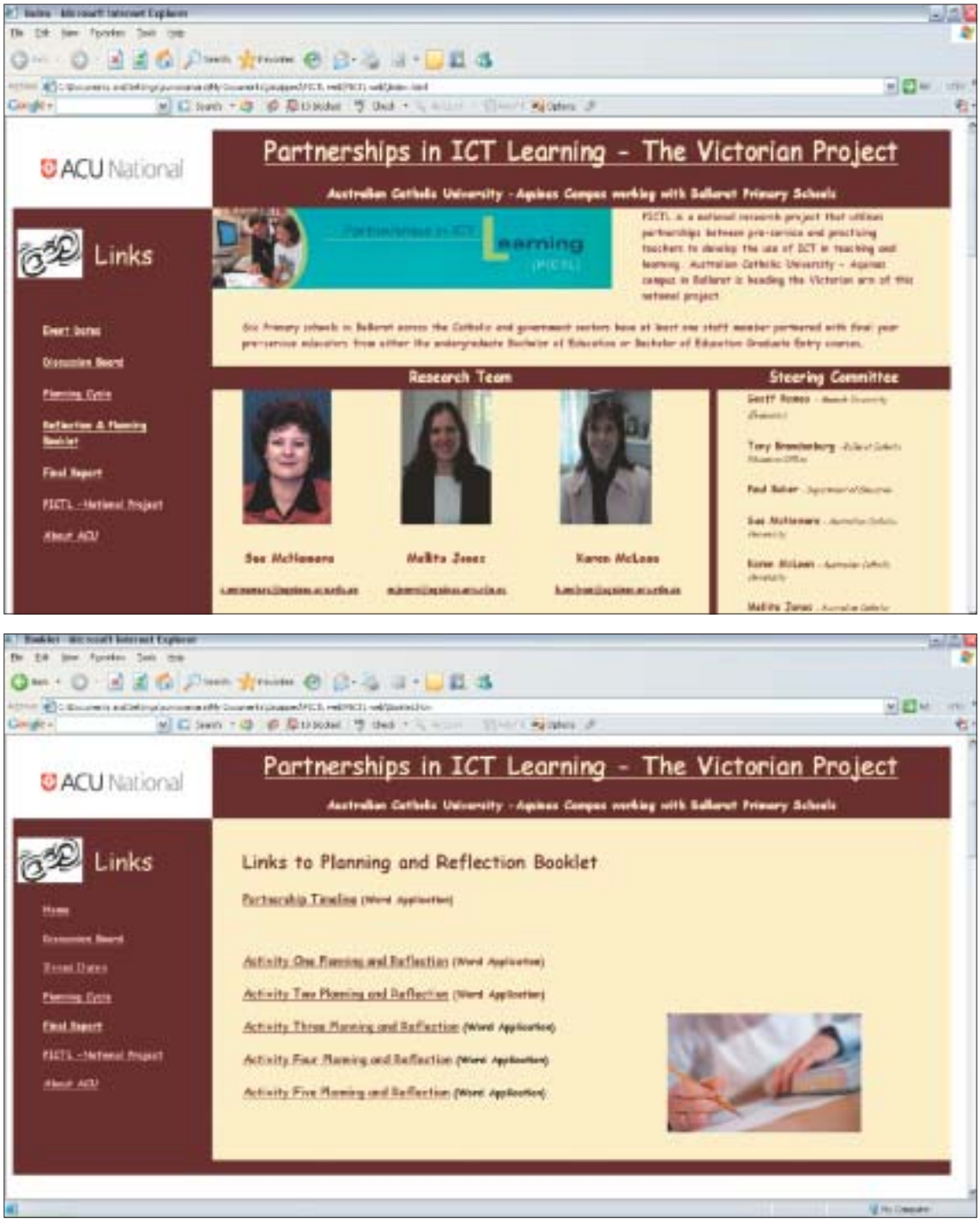


Figure 2. Samples from the website

Workshop 3: The new stories — project debrief

This final workshop took place early in Term 2. For this workshop the research team searched for an appropriate, engaging manner in which to explore both the journeys the teams had taken and the new stories of their knowledge, understanding, skills and thinking which might be written. The workshop took on a life of its own and a dynamic, iterative process was applied to the activities as the excitement of the participants gained momentum during the morning session of this final day. After the welcome "cuppa" teams were given a few minutes to collect their thoughts and make final preparations for revealing their learning from their projects.

It was emphasised by the research team that in this project they would not be defining "success" or "failure" but rather celebrating all of the learning — both negative and positive — which had taken place. Of interest was the journey. Permission from participants to videotape their sharing was requested and received.

Throughout the project participants had been reminded that this journey was one of a number being taken across the nation. As a means of providing them with a window into the "bigger picture", and using an opportunity which arose during the planning phase for this last workshop, a videoconference with the national project officer was organised as part of this final day's activities. The videoconference served two purposes. Firstly it enabled the project team to utilise a broader contextualisation for their reporting and conversations in the final "round-up session. It added further dimensions to the conversations. Secondly, it was anticipated that it might provide the "national" project, through the project officer, with a better understanding of a local perspective on the project.

At this final workshop the plan was to move from reflection into building new stories which participants could take away with them. Of concern was that this "end time" may be a "downtime" after the intensity of the past few weeks, but this concern was unfounded. In the morning session the image of a tree growing new branches was used as our reflection tool. Participants were asked to add a reflection written on a new leaf to the branch of the A3 sheets designed for the activity as they moved through the various questions of the project. By the afternoon there were a number of "fully grown" trees and the group was seeing both "the forest and the trees". Most of the participants had their own new stories well in the planning by the afternoon's final session. The formal processes were completed with handshakes, congratulations and distribution of certificates in recognition of participation.

Data collection and analysis

Underpinning all of the workshops, and pulling the threads into the rich tapestry of stories being built, was the translation of the model into the approach employed in the project.

The project was viewed as an holistic, reflective undertaking with all participants required to keep an account of their various ICT undertakings and encounters using a selection of media including journal, audio/video, group discussion and e-mail. The learning encounters became the sources for discussion and reflection by the partners and constituted the stories of professional development through the partnership.

As noted earlier, data were collected through a variety of instruments ranging from surveys to multimedia and pictorial journal collections.

An iterative process was used in data analysis. Within-and-between group analyses were conducted on the survey data to identify any key differences and similarities in attitude, approaches and experience of ICT between pre and practising teachers over the journey of the project. Observational and conversational data along the journey were reported in journals and in the responses to questions in the booklet provided to each partnership to try to encourage a collaborative approach to reflection. Some participants also kept a personal journal and took video/still photographs to help tell their stories. They also prepared a presentation of their experiences for sharing with the other partnerships during Workshop 3.

Workshop 3 was designed for the sharing of the stories of the project. Each partnership gave a presentation of its project. Presentations were made using technology and multimedia approaches. The presentations were also captured on video and where possible, electronic data were stored for future analyses. Reflections on the learning achieved by the participants, as well as their reflections on the partnership model were key items of this session.

Results

Of interest were the stories of experience of participants with regard to ICT skills, knowledge, use, understanding and experience. Further interest was in the stories of partnership which were created. In exploring these perspectives, questions included: How did they plan? What did they plan? How was ICT incorporated and how did they perceive of its effectiveness? In looking at the nature of the partnerships the questions were: What was the partnership experience like? Did they learn from each other and if so how, or — if not — why not? The following paragraphs detail the findings.

Focusing on technology: Prior experience, confidence and philosophy

"Starting from where people are at" was one of the major premises of this work. In order to establish a broad picture of the current situation facing the participants in the study, the kinds of ICT and the types of experiences they had encountered were first explored. In order to check for possible growth, notwithstanding the brief time frame of the project, a pre and post-surveys were used. The range of ICT encountered and the perceptions and experience of practising and pre-service teachers towards them are presented in Table 1. Teachers indicated, prior to participation in the project, that in the majority of cases they worked with a technology teacher or another teacher in order to plan lessons which incorporated ICT. Only in one case did the teacher plan lessons incorporating ICT independently.

Table 1. Responses to questions exploring understandings of the use of ICT in education

Response	Pre-service teacher		Practising teacher		Total	
	Initial	Final	Initial	Final	Initial	Final
Involves skills, knowledge, use of ICT	4	0	3	0	7	0
Communication tool	0	0	5	2	5	2
Enhance student learning	3	2	2	5	5	7
Enhance teaching	2	3	2	3	4	6
Teacher/student resource	0	4	3	3	3	7
Tool for learning across the curriculum	2	5	0	5	2	10
Engage students	0	0	1	4	1	4

The initial survey also asked participants to outline their understanding of ICT in education. Responses were grouped into common themes. In most instances participants described ICT in education to be about skills, the use of particular hardware, and software configurations. It was also strongly viewed as a tool for communication and most used the generic phrase "enhancing student learning". No particular specification of how this was observed or measured was indicated. Only in a few cases was it seen as a tool for learning across different curriculum areas.

By the conclusion of the project (as indicated in the "Final" column of the table) it can be suggested that pre-service teachers moved slightly from seeing technology from the perspective of a learner to that of a teacher. In particular, they began to see ICT as a tool for learning across the curriculum. Practising teachers moved from a concentration on technology as a communication tool to a perspective which embodied a broader understanding of its potential in teaching and learning. The original emphasis on communication might reflect current educational authorities' views and education foci on the internet as a predominantly text-based, passive medium or information source. The more holistic dimensions of technology as multimedia or rich media incorporate vision, audio and motion as well as text.

Prior to the implementation phase participants undertook an activity which explored their general confidence with ICT. Results indicated that more than half of the participants were feeling positive about the project. Some did indicate apprehension. Of these a few felt negative and overwhelmed. Part of this negativity may have been related to the two big curriculum projects being undertaken in the state at this time, the significant change of reporting procedures, and the implementation of the new curriculum frameworks. In this context apprehension was understandable as different schools were handling the two large projects in different ways, some with which teachers were comfortable, some of which were more problematic. Further explanation of apprehension might be related to the concerns which participants noted about ICT itself. Some were concerned about their personal skill levels, and the group in general noted curriculum issues and the reliability of hardware as an ongoing issue in schools. In spite of this, a majority of participants acknowledged the variety of activities that ICT could offer in the classroom, as well as the positive effects it could have on engaging and empowering students in their learning. This latter point, however, was not elaborated.

One of the major points raised in the participants' philosophy statements during the initial workshop was the fast-evolving nature of ICT and the need for ongoing professional development for teachers. A strong need for incorporating ICT in teaching and learning now was recognised in order to prepare students for an active role in society in the future. In discussing the best ways to achieve skills, knowledge and understanding in ICT, participants noted in particular the need to use ICT effectively and to integrate it throughout the curriculum, using it as a tool. Some participants also acknowledged the power of ICT to engage children with learning difficulties and disabilities, and reiterated that funding is essential to ensure equity of access and to enable both teachers and children to keep abreast of developing technologies.

Following the development and implementation of the partnership projects, the final survey asked participants how they would rate the effectiveness of the project in developing their skills in using ICT and in developing teaching and learning that incorporated ICT. Respondents were positive in describing how their skills, understanding and knowledge of ICT had been developed through their participation in the project. They were unanimous that their involvement in the project was very effective in helping them develop teaching and learning that incorporate ICT.

In describing how participation in the project enhanced their learning and practice, practising teachers indicated that the individual participants were able to help their partner with ICT skill development. Practising teachers perceived that they were able to help pre-service teachers with knowledge relating to: particular functions such as the use of printing options (how to print A3 booklets, inserting pictures, borders, and using frames on posters); the insertion of video clips into digital portfolios, and hyperlinking; the use of the interactive whiteboard. Pre-service teachers too noted that each team member brought different skills to the group. For them, sharing their different ICT skills and new knowledge and experience proved to be a most effective means of teaching and learning. Pre-service teachers indicated that they were able to help practising teachers in more general ways. They perceived that they provided general support and suggestions during planning and implementation, in conjunction with providing practical assistance in many cases. An example of this was in the use of hardware and software such as the camcorder; *MS Frontpage*, with digital photography and the use of *PowerPoint*.

The themes of the stories: Relationships; knowledge, understanding, skills and a human-centred, holistic reflective model

Responses to the survey and conversations about the items in the survey provided scaffolding for the development of the overall description of this project. Perhaps more important, however, was the contribution of the participants' reflections and experiences throughout their undertaking as they implemented the model. Three themes dominated their responses: (a) Relationships; (b) Knowledge, understanding and skills; and (c) the human-centred, holistic reflective model.

Excerpts from their comments on the notion of partnership are presented in Figure 3. Figure 4 identifies the characteristics of knowledge, understanding and skills as they interpreted them and Figure 5 presents a brief selection of comments about the model.

Relationships
Partnerships meant that more was achieved together!
The partnership kept the focus and maintained the intensity. The cycle impacted on the direction of the unit — as it was developed it was allowed to evolve!
The partnership was fantastic. We both contributed and stuck to it and learnt from the process.
The cycle was beneficial…making time to reflect was fantastic.
Partnerships meant that more was achieved together!
I will have pre-service teachers in the classroom to work together at any time!
The partnership/team approach was extremely supportive and effective.
The interaction between pre-service teachers and teachers was very powerful!
We've been very isolated not having an Information Technology teacher here.
…what we have learnt and how we've supported each other, the group dynamics has worked extremely well…very workmanlike in a professional way…we've shared…the rapport between the group has worked well…the interaction has been very good.
It was great to work in a professional relationship where we were equals and did not feel under pressure.
I found the mentoring was really good…on rounds you feel like you're on trial and I don't think it should really be like that all the time.
The support while you're trying something new. I probably would have given up ages ago if it wasn't for this and persisting with it…
Taking out the assessment broke down the barriers between teacher and pre-service teacher and enabled a more collegial approach to be used. Teachers didn't feel under pressure to provide all the answers and pre-service teachers didn't feel under pressure to perform.

Figure 3. Sample comments about relationships

Knowledge, understanding and skills
I will continue to apply the use of e-mail and hyperlinks… I have also turned my laptop from a toy into a tool!
I will be better prepared to incorporate ICT in learning in the classroom.
I understand more clearly how ICT can be used in an integrated curriculum.
I have a better understanding of the possibilities that ICT presents for student learning.
I will use more ICT in the classroom to develop deeper understanding…
An aspect of my teaching that may change from this project is "Hands on," "Hands on," Hands on!" If ICT is relevant we will use it!
Before we started I was a little apprehensive and my focus was really on something that was going to benefit my students and my skills and I'm really delighted that we actually achieved that …and we have the skills now to keep going.
…in terms of my skills I learnt more from showing you how to do it …it meant that I had to be able to really understand what I was doing…
…the biggest thing I learnt with technology is that it doesn't have to be complicated.
It gave us all a real purpose to develop skills, knowledge and understanding in ICT.
Technology, I really scooted around it …but this is something that's got me in now and I don't think I'll look back …it was something I thought you'd have to drag around with you for the first six weeks but really it was like the sails…
This project helped make it all real. I recognised a real need for using ICT and therefore I was motivated to learn.

Figure 4. Sample comments about knowledge, understanding and skills

A human centred, holistic, reflective model
Once we began it was a natural easy going process… the lessons flowed.
I would like more time to explore ideas we came up with during the project.
From this project I would like to be involved in more classroom experience conversations to build on learning. This was a very focused project — time hungry but worth every minute!
It was so valuable to be a part of a school aside from teaching rounds. The cycle allowed for personal development of ICT and teaching skills in general.
My ICT skills, knowledge and understanding improved …Creating digital portfolios as a means of authentic assessment …hyperlinking to video presentations …using the intranet.
It's been real, hands on, very authentic learning.
It was invaluable for me to see N's approach in his class not just with this but in general…
A skills input at the beginning through the middle of the cycle may have been helpful.
This project enabled authentic contexts for learning to be developed.

Figure 5. Sample comments on the model

Two areas requiring both further research and action were identified from the multimedia journals made by the participants during interviews in the course of data collection. These were the short timelines and the need for technical support in schools. Short timelines were noted in the context of this project, but are also related to the nature of professional development. Short-term minimalist designs may minimise the effectiveness of the program due to a lack of time for reflection, implementation, follow-up clarification and consolidation of learning. Similarly, most participants noted on a number of occasions the need for much greater technical support in schools, particularly in the context of the speed of change of technological development. These general findings set the scene for the stories of the partnerships.

To the stories of the partnerships

The partnerships provided the essence of the stories which encompass the real richness of this project. It is through the stories that we can find evidence of the work which succeeded and the work still to be done if technology in education is to reach its full potential.

There were five different partnership formations. Three of these were pairs consisting of one practising and one pre-service teacher. The other two partnerships consisted of teams. One team comprised a group of two practising teachers and three pre-service teachers. The other contained two practising teachers and two pre-service teachers. Within the partnerships a variety of skill levels was evident. One partnership worked with a Prep/Grade One class and collectively described their ICT skill level as low. A second partnership consisted of the technology specialist in the school and a medium-skilled pre-service teacher working with Grade One children in a Prep/One class. The third pair contained two medium skilled participants working with Grade 4 children. The two team partnerships were slightly different. Both contained more than one practising teacher and pre-service teacher. Each implemented a buddy system between a lower and higher grade level. Thus the fourth partnership "buddied" Grade 2/3 children with Grade 5/6 children, whilst the fifth partnership had Grade 1/2 children working with a Grade 5/6 class. The skill levels in the fourth team ranged from low to medium-high, while participants of the fifth team all nominated themselves as being of medium skill level.

The members of one partnership focused on their own skill development. They used a common theme of positive social behaviour as the focus of their activities with the children, each cycle in their project having a different ICT emphasis. The partnership initially videotaped their Prep/One students role-playing positive social behaviours in the classroom and utilised Windows Media Player to view them. They then used a digital camera to photograph their students role-playing/demonstrating positive social behaviours and combined both the video and photographic materials in a slide show using speech bubbles. The final product was for use with the children.

Both participants in this partnership identified themselves initially as having rather low technology skill levels. For them, a major purpose of the partnership was for each to improve individual skills, knowledge and understanding of ICT across the curriculum. Their classroom activities were teacher — and pre-service teacher — controlled as they felt a need to develop confidence before they could encourage children to use the technology. This was particularly relevant in the context of the Prep/One classroom in which they were working.

The model worked for this partnership because they were able to start from their initial ICT skill level and build upon it. The participants reported that the model worked for them because it commenced at their level of skill and the cycles allowed them to build on their learning, giving them the confidence to involve students in the use of ICT in further cycles. On the final day the participants reported significant gains in skill and confidence in using ICT. They described one of the strengths of the project as being linked to the opportunity to develop skills, knowledge and understanding using ICT in an authentic context.

A second partnership also used a theme of positive social development with Grade One students. The interactive whiteboard was used as a scaffolding tool that ultimately led to a multimedia presentation which integrated digital photography and captions using Windows Movie Maker.

This partnership involved a pre-service teacher with medium ICT skills and a practising teacher who was the technology specialist in the school. The collaboration in this partnership involved working together on something new for both participants, as well as providing an opportunity for the pre-service teacher to develop new ICT skills supported by the practising teacher, within an authentic classroom context. In this way this partnership operated on two levels — collegial and mentoring.

The participants believed that the model of professional learning worked for them. They described the nature of the partnership and the cyclic model as factors contributing to perseverance when challenges arose and to the overall success of their project. The participants reported growth in ICT skills, knowledge and understanding. This was partly attributed to the structure of the project. They felt that the project design encouraged reflection, persistence and problem solving when challenges arose. In particular, the practising teacher commented on the value of making time to sit and reflect on teaching as this is something for which time can rarely be found in a teacher's day.

A third partnership used their common interest in music to develop a series of cycles, each building on the previous one. Cycle one started with participants video recording the students performing their own Commonwealth Games rap songs. Cycle two moved to the students video recording and editing in Windows Movie Maker their Commonwealth games rap songs and Cycle 3 saw the students, with their teachers, dubbing in voice, music and sound effects. Throughout the cycle "My Classes" was used as a communication tool between home and school by both teachers and the students who had access to it. This enabled students to use e-mail and attachments to support the creation of a music film clip.

This partnership addressed the challenges of their project from a curriculum perspective. A shared love of music was the impetus for the direction this project took and ICT was interwoven naturally throughout the cycles. Bransford, Brown and Cocking (2000) summarise such processes as "the media production [was] continuous with and a direct outgrowth of the learning that is embodied in the media production" (p. 13).

The Commonwealth Games was a key curriculum focus in most schools in Victoria during Term 1, 2006. However the nature of this partnership enabled a fluid integration of ICT, music, English and the Commonwealth Games into the classroom program through the development of a mutually beneficial relationship between practising teacher, pre-service teacher and students. So significant was the pedagogical shift in this partnership that the participants described the timeline as not having a negative effect on the success of the project as it provided a structure for the project to evolve naturally.

This partnership described the model as giving them a workable time frame and focus that still allowed for flexibility and creativity. Again, the model enabled participants to identify a mutual area of interest and the ability to determine their own entry and exit points. In this way, learning was relevant and sustainable for both participants, and occurred in an authentic context. At times during the cycles the participants reported learning from students in the classroom. The use of ICT had become such a natural part of what occurred that student skills, knowledge and understanding were also evolving during the cycles.

In this partnership both participants described themselves as having a medium level of ICT skills and reported growth in skills, knowledge and understanding at the conclusion of the project. Whilst specific learning for these participants focused on movie-making skills such as dubbing, video editing and sound effects, the extent of their learning went beyond this. The partnership described a pedagogical shift in their understanding of ICT in education. In the past while ICT may have been included in classroom activities, this project has resulted in transformational learning for the participants where ICT is now an integral part of the pedagogy. This was evident in the focus of the practising teacher's comments on the beginning and final survey to the question "What is your understanding of ICT in education?" Prior to involvement in the project the teacher responded to this question in a very skills-orientated manner: "Learning ways to gather and present information… learning internet skills." At the conclusion of the project the teacher responded to the same question: "If you look at education wearing ICT glasses you can begin to see a different spectrum of ideas to teach and way to assess."

This change may be indicative of the beginnings of a transformation in the way the teacher views teaching, learning and technology. It describes a pedagogical shift.

The fourth partnership involved two pre-service teachers and two practising teachers working as a team, again using the theme of the Commonwealth Games. A "buddy system" was used between two classes. In this partnership Grade 5/6 students researched Australian athletes and paired up with Grade 2/3 students to share this information and work together using Microsoft Word to create A3-sized colour posters. The roles of the pre-service teachers and practising teachers in this partnership were clearly defined and differentiated. One reason for the roles being separated was to enable adherence to the very "tight" timeline of the project. The pre-service teachers in this partnership planned to video tape the development of the project from planning to final production, with the idea of using the footage to assess the process of learning and production rather than just the end product. Although the plan for the partnership did not eventuate as hoped, individuals within the partnership continued to complete the curriculum project they had designed.

All members reported problems with communication in the partnership. A number of factors hampered the progress of the partnership. The short term, the constrained timeframe of the project, school interruptions, pressures of the new assessment regimes being implemented in schools, and problems of coordinating timetables contributed to some of the communication difficulties described by these participants. Expectations and the differential interpretation of them meant that the shared nature of the partnership did not operate as in others. The delineation of tasks throughout the cycles may have been a contributing factor to the communication problems. Again, perhaps the segregated nature of the roles associated with this partnership meant that the members of the team were acting more independently than were those in other groups. The practising teachers noted that their relationships in working with each other were strengthened over the duration of the project. In this partnership there was an identified need for collaboration between the practising teachers, but a need for cross-collaboration between the pre-service teachers and practising teachers appeared redundant. The practising teacher participants described growth in their understanding of the use of ICT across the curriculum and they attributed this to the collegiality among them as they worked on the project.

The final partnership sought to improve digital portfolios for students. This involved moving from text-based to non-text based presentations. The students video taped themselves talking about family, school and learning goals. This video footage was incorporated into the home page of their individual digital portfolio using Microsoft FrontPage. The combination of three pre-service teachers and two practising teachers seemed to be a contributing factor to the success of this partnership or team. The ICT skill level of participants varied from low to medium-high. Participants described themselves as collegial throughout all stages of the project. At no point during the cycles did the emphasis shift from a collegial to a mentoring relationship. They reported that the planning, implementation and reflection processes were all carried out collaboratively, with the ICT skills of each individual member being called upon at different stages throughout the cycles.

The nature of this partnership also had benefits for the students. The buddy system presented the opportunity to model the collegial aspects of this partnership for students, who in turn reportedly engaged in a similar kind of learning with their buddies. Each team member described his/her experience of the model as providing an authentic context for teacher/pre-service teacher learning. It was suggested that the real context explored in this partnership enabled participants to engage reflectively in the form of group discussion.

The project cycles of this last partnership also examined authentic assessment practices in the classroom and moved from a teacher-directed, textual base to a student-centred, digitally-based assessment practice. Although the focus of this project grew out of a perceived need, it should be noted that pedagogical reforms were evident in both student behaviours and participant behaviours. Notably, the reflective process used to record children's learning during the cycles was also used in the partnership. By the final stages of the cycles the partnership began recording their reflections and discussions on digital video to be incorporated into their final presentation. This demonstrated a pedagogical shift in their perceptions of what constituted recording authentic learning.

This partnership also reported improvement in ICT skills, knowledge and understanding for all members of the group. This is an important observation of the partnership as a group, as individuals within the partnership started the project with varying ICT skill levels. It was suggested that although ICT skill levels varied within this group, each team member brought different skills to share and thus supported the common goal. Collegiality seemed to enhance the learning experiences for all.

In summary, although the learning concentration of most of the partnerships was derived from a skills focus, with knowledge and understanding being embodied in the ideas of skill acquisition, the individual nature of the different partnerships affected the "whole" learning of the individuals within the partnership.

Discussion and implications

This project had a number of dimensions. It sought to explore the nature of partnership as a means of improving ICT knowledge, understanding and skills. It was framed within an holistic, human-centred, reflective model of practice, drawing on the strengths of story and narrative in presenting the richness of the experiences of participants which might eventually and substantially lead to transformational learning.

Over the period of the project a shift in the way ICT was perceived was observed. By the conclusion of the project perceptions had moved from those linked mostly with technology as communication with a focus on the learner, to a broader, pedagogically-based perception, embracing the learner, the teacher, the curriculum and the technology.

Motivation was a key factor in the success of the individual partnership projects. Participants needed to be self-sufficient and self-reliant. Seeking and searching for answers became an important focus for their learning. Further, a genuine need to improve knowledge, understanding and skills, and a desire to learn was required. This resulted in an experience that was authentic, valuable and enriching. In the responses to the final survey the majority of participants reported how effective the project had been in enhancing both their understanding of ICT and their ability to use it effectively in teaching and learning.

The approach taken to partnership in this project differed from the traditional teacher-student relationship. In most of our partnerships the participants were considered equals, regardless of their teaching "status". The success of this strategy was evident in the many comments made, particularly by pre-service participants, that it was valuable to be working in the classroom with an experienced teacher without the pressure and threatening nature of assessment of their performance influencing their involvement. Assessment is one of the characteristics of the pre-service teacher practicum. The pre-service teachers reported an ability to relax in the teaching and learning roles and to experiment and take risks, knowing that the planning, delivery and responsibility was fully shared with their teacher partners. As noted in one partnership, the collegial nature of the partnership meant that each member had the opportunity to contribute to the learning of the group and to the students in the classroom. In the collegial configuration, as pre-service teachers were able to contribute without the pressure of assessment, so practising teachers were able to engage in a relationship with pre-service teachers without conforming to a hierarchical pedagogy which often characterises the practicum experience.

The success of this strategy has implications for the future of professional development for practising teachers and for the design of practicum for pre-service teachers. If the relationship between teacher and pre-service teacher is one which can continue to encourage both in the pursuit of more comprehensive, appropriate thinking about technology and curriculum, then it might be suggested that this basis will provide a much improved, deeper and sustainable framework than do current approaches.

Several issues related to funding and this element would be fundamental in any increase in scaling of the current project. This project was served well by the voluntary nature of participation. With volunteer participants group intimacy and a high level of commitment to the project was achieved. A large-scale project may still achieve good ideas for teaching and learning with ICT but, if not a voluntary scheme, pre-service teachers may be less willing to invest the time and energy required. Teachers may also be less willing to make time or welcome pre-service teachers into their busy classrooms. Achieving such levels of commitment on a large-scale would require considerably higher levels of funding within practicum programs and for schools and individual teachers to ensure participants had the appropriate time release to manage workloads. From the perspective of teachers, and with regard to current funding of professional development, funding might better be directed to such a model than for the single day, skills-based, just-in-time, current models of professional development for practising teachers.

Finding common time between teachers, pre-service teachers and university staff was very difficult in this small-scale study. Obstacles such as class timetables, school programs, university programs, student part-time work and other commitments all made it difficult to meet as regularly as was preferred. If partnerships worked as well as those in this project, meeting times may not be an issue. However, in reality the issue of time relates to the issue of funding. Ingvarson, Meiers and Beavis (2005) alert us to the need for follow-up and ongoing assistance in the school or classroom to help teachers implement changes advocated in programs. If support structures from the university are required, even if only for some of the partnerships, then funding for this will be necessary. Staff would need time and resources to liaise with partners and schools effectively and in the on-going nature purported by Ingvarson et al. (2005).

Other issues associated with funding include the participants' reported need for "on-the-ground" technical support. Time was already strained for meeting and planning, but when resources and practice in using the technology were required, participants reported feelings of being stranded and frustrated by not having immediate technical support. Teachers need assistance in learning how to use applications and software, as well as in setting up hardware and storing information. Networks proved to be a considerable problem for many of the teachers in the project as they had considerable "mystery" around them and were seen largely as the territory of "specialist technicians" rather than as a facility for teachers in general. Each of these attributes of working with ICT can become a barrier to pedagogical implementation if the support required is not forthcoming. Considerable thought needs to be given to the provision of sufficient funding for technical support.

The participants in this project were placed in partnerships at random. When participants work with someone of similar skill-level, it might be presumed that they are better matched to participate in a collaborative manner, which in turn may affect the satisfaction of participants. It may well provide a better chance for the partnership to set and achieve goals that provide a valuable learning opportunity for both participants. Contrastingly, the differentiation of knowledge, understanding and skill levels may well complement and strengthen those of others in the partnership.

The reflective nature of the project was also crucial to its success and has implications for any attempt to broaden or replicate the approach. The time to reflect on the activities with a partner was recognised by participants as something for which they rarely have time. The success that this practice contributed to the present project confirms the findings of authors such as Ingvarson et al. (2005). This is perhaps even more important than working with a partner of similar skill level. In this study we had a low-skilled pre-service teacher in a team partnership and a medium-skilled pre-service teacher working with the technology specialist in the school. All participants in these partnerships reported positively on their learning and overall experience. At times the emphasis was different. For example, the technology specialist teacher focused on the benefits of reflective practice and ability to develop and plan ideas with a partner, whereas the pre-service participant reported that the most significant learning achieved was in the areas of the skills, knowledge and understanding in using and applying ICT in the classroom.

The partnerships established allowed for opportunities "for teachers to talk about specifics of their teaching practice and student learning, share ideas and support each other as they attempt to implement ideas from the professional development" (Ingvarson et al., 2005, p. 14), but rather than implementing ideas from a professional development program, the design of the project as professional development included the generation of these ideas whilst adding an element of ownership.

The close collaboration of the partnerships was a reflection of the researchers' relationship. The researchers not only modelled an effective partnership but also utilised individual strengths to create a sum greater than its parts. This collaborative approach naturally added an additional time pressure for the researchers, due to the need to meet for planning, reflecting and writing. However, that this team approach contributed to the quality and depth of experience for both the participants and for the researchers.

Conclusions and recommendations

This research project emphasised three issues relating to ICT education: the notion of partnerships in ICT in education; transformational learning that incorporates the integration of ICT into a teaching pedagogy, and the sustainability of a model of learning within a lifelong learning framework. The local project explored the potential of partnerships among pre-service teachers and practising teachers to develop ICT knowledge, understanding and skills.

Within this small project change was substantial. The more successful partnerships demonstrated an altruistic motivation that would be difficult to achieve in a large-scale project. A determining factor of success was the collegial relationship of equals.

Similarly, within the context of regional and rural education, the partnership between the Australian Catholic University, the Catholic Education Office, the Victorian Department of Education and Training and the schools in the Ballarat region worked extremely well. Replicating this relationship on a larger scale would require considerable reconsideration of size and complexity in order to achieve equivalent results.

Within the Australian Catholic University, the research team engaged in an individual partnership designed to support the learning of participants. The ability to monitor, report and reflect on the stories of participants and to support each other in a collegial manner required a significant commitment by each individual member. This collaborative approach enabled a rich collection and analysis of data — both qualitative and quantitative — but in doing so made it impossible to meet project timelines. The Team Model was imperative to the success of the project as it gave the project both scope and depth, but in terms of time commitment on a small-scale project, the intensity of this partnership required a more flexible timeline than would be achievable for other larger-scale projects.

The second key finding of this project raised questions about the quality of learning achieved through partnerships and professional development programs. This project found that while skill provision may be a good starting point for learning, it is superficial and doesn't contribute greatly to the encouragement of transformation without significant "human centred" support. In this project, those participants who moved beyond skill development were able to describe pedagogical shifts in their teaching. The data suggest that growth in this area occurred through the merger of a complex range of circumstances: a reflective model of learning; a collaborative partnership supportive of constructive feedback; a collegial relationship between partnerships; a joint focus on student learning between teachers and pre-service teachers, and an identified need and desire to improve understanding of ICT in education in the current educational climate.

This project implemented an holistic, human-centred reflective model with the aim of fostering the development of lifelong learning. What was achieved through the use of this model was sustainability of learning for individuals, supporting each other. In short, the participants experienced a model of learning which enabled them to begin "where they were at" in their learning, build on this and continue to build long after the project has finished. Back in their schools — or in the case of the pre-service teachers, the schools wherein they commence as professional practitioners — these participants will no doubt be the change agents who will forge sustainable growth in understanding ICT in education. Perhaps this is the notion of sustainability that needs further exploration. The conclusions of this research suggest that pedagogical change in relation to ICT in education cannot be imposed on individuals but can evolve through models of learning that support change at a deeper level.

A key recommendation from this study is that professional development focusing on ICT in education should be delivered as small-scale with an emphasis on deeper learning rather than skill acquisition as a priority. This report also recommends that professional development is delivered in a collaborative manner using a reflective model of learning. The collaborative and reflective elements of this project influenced the depth of learning that occurred and contributed to pedagogical change.

In relation to the pre-service teacher/practising teacher partnership this report recommends that any future partnerships should take into consideration the very nature of *partnership*. It was evident in this research that the collegial nature of partnerships where pre-service teachers and teachers interacted as equals was a significant factor in the success of the project. If pre-service teacher assessment was to be embodied in this partnership it would alter the relationship and the ability to focus on student learning. In short, it would adversely affect the outcomes.

A second recommendation is that partnerships and professional development programs should be related to authentic, needs-based learning. With autonomy to decide their learning needs, participants were able immediately to implement and develop what they were learning, rather than "put it in a pocket until later".

Finally, integral to any further action being taken, funding must be addressed. An immeasurable amount of goodwill was placed into this project, ultimately contributing to its success. Any attempts to replicate in other contexts would require significant funding. Funding for time commitment, funding for quality resources and funding for technical support are key considerations for implementation on any scale.

References

Bransford, J., Brown, A. & Cocking, R. (eds). (2000). *How people learn. Brain, mind, experience and school*. Washington: National Academic Press.

Fullan, M. (2001b). *Leading in a Culture of Change*. San Francisco: Jossey-Bass.

Howard, A. & Walsh, A. (2005). *Mercy and Justice Shall Meet*. Fraynework Digital Storytelling.

Ingvarson, L., Meiers, M. & Beavis, A. (2005). Factors affecting the impact of professional development programs on teachers' knowledge, practice, student outcomes and efficacy. *Education Analysis Archives*, 13(10). Retrieved 14 May, 2006 from http://epaa.asu.edu/epaa/v13n10.

Korthagen, F. (2001). *Teacher education: A problematic enterprise in linking practice and theory: the pedagogy of realistic teacher education*. Mahwah, N.J.: Lawrence Erlbaum Associates Inc.

Kurtz, C.F. & Snowden, D. (2003). The new dynamics of strategy: Sense-making in a complex and complicated world. *IBM Systems Journal*, vol. 42, no. 3.

Schrum, L. & Glassett, K.F. (2006). *Technology Integration in P–12 schools: challenges to implementation and impact of scientifically-based research. Journal of Thought*, vol. 41, no. 1, pp. 41–59.

Victorian Essential Learning Standards. Victorian Curriculum and Assessment Authority http://vels.vcaa.vic.edu.au/

Warner, D. (2006). *Schooling for the Knowledge Era*. Australia: ACER Press.

Sustaining partnerships in ICT learning

REPORT FROM THE NATIONAL PICTL FORUM

Background to the forum

Context

The Partnerships in ICT Learning (PICTL) study is a quality teaching program project — funded by the Department of Employment, Education and Training (DEST), to explore the potential of partnerships between universities and schools, aimed at professional learning about using ICT in new curriculum and pedagogical frameworks. The study provides professional learning pathways for pre-service teachers, teachers and university staff.

The study is being managed by the Australian Curriculum Studies Association (ACSA), the Australian Council for Computers in Education (ACCE) and the National Centre of Science, ICT and Mathematics Education for Rural and Regional Australia (SiMERR).

A university from each of the eight states and territories conducted a local project to explore new ideas for partnerships that would enable pre-service teachers to collaboratively develop ideas for effectively using ICT in classrooms and supporting teacher professional learning programs. The eight teams worked with the project management team and steering committee to develop a national report to respond to the eleven research questions underpinning the project.

Evidence of success and innovation

RQ 1 What does the evidence of relative success of the state and territory projects, based on the feedback of participants, mean for responding to the broad research theme?

RQ 6 What innovative approaches were used, and how successful were they?

Partnerships

RQ 2 To what extent do the various groups (schools, universities, government/non-government authorities) succeed in working together to achieve the desired outcomes?

RQ 3 What are some of the challenges in trying to implement successful partnerships between differing levels of educational bureaucracy (e.g., governance issues, organisational issues)?

RQ 7 To what extent was it possible or necessary to transform teaching and learning environments and practice?

RQ 8 What were other barriers and critical success factors affecting the success of the strategic PD partnerships?

Towards sustainable models

RQ 5 To what extent is effective PD in this area dependent on whole-school or system-wide reform? What change-management issues were faced in trying to achieve these reforms? What cultural change was/is necessary?

RQ 10 What are possible strategies for sustaining the partnerships beyond the life of the project?

RQ 11 What are recommendations on ways to develop innovative PD projects on a wider scale?

Management

RQ 4 What are key project management issues (e.g., importance of defining scope, methodology)

RQ 9 What are the advantages and disadvantages of using online networking tools (e.g., online communities of practice, closed discussion groups, extranets) to support these partnerships?

The management team of the PICTL study were required to:

- facilitate the design of the local projects hosted in states and territories;
- conduct research which would feed into the final report;
- host a national forum to engage in the issues underpinning the key agendas in the project;
- complete a final report.

The purpose of this report is to provide participants and other interested parties with a synthesis of the outcomes of the forum that were drawn from the keynote addresses and discussion sessions. The report follows the structure of the forum program.

The forum was designed as a two-day program, where on day one, local project officers shared early results of their projects and highlighted emerging issues. Day two of the program was designed to investigate these issues further and to consider the national implications for changing pre-service teacher education and inservice education models of learning. The forum program is included as an Appendix.

To provide benefit from a diversity of experiences and perspectives, a range of people were invited to attend the forum. Some were drawn from local projects including teachers, pre-service teachers, lecturers and other staff supporting pre-service teacher education. A range of "experts" in pre-service teacher education and professional learning models were invited to generate the diversity of perspectives.

Day one — forum opening

Welcoming the participants to the forum, the facilitator, Tony Mackay, thanked people who left workplaces and study schedules to contribute to this event. He indicated this forum had the capacity to both shape the future of partnerships between universities and schools and the opportunities for teachers and pre-service teachers to explore new uses of ICT in schools through professional learning. Mackay suggested the papers contributing to the forum indicated that the issues were shared, and thus promised opportunity for discussion and debate. He also suggested that the diverse experiences in the projects meant that participants would learn from each other, and the synthesis of ideas would inform personal practice in the workplace and in study. His final message was to encourage people to share ideas and thoughts openly, to contribute actively and to take advantage of the opportunity to shape national planning.

Keynote address one: Welcome

Gary Powell

The first keynote address was given by Gary Powell, Manager, Performance and Targeted Programmes Branch, Department of Education, Science and Training (DEST). Powell had distilled the themes from the state and territory reports he had read, which would provide a framework for discussions over the two days. The key themes were:

- Embeddedness
- Partnerships
- Sustainability
- Collaboration
- Maintaining conversations in the field.

Powell indicated that this group had the potential to become an ongoing, national community of practice (a network) around the agenda of ICT and pre-service teacher training. He acknowledged this agenda as an important priority of DEST, who see this PICTL study as the initiation of valuable strategic partnerships between universities, schools and teachers, and the education systems.

The study had its origins in May 2002 with the release of the report *Making better connections: Models of teacher professional development for the integration of information and communications technology into classroom practice* (Downes et al., 2001). The report recommended stronger links between pre-service teacher education and teacher practice. The findings of this research have potential application at local, state and national levels.

Powell indicated the role of this forum could be pursued by considering these questions:

- How can collaboration and partnerships be better accommodated in universities, schools and systems?
- How can this pilot study be transferred to mainstream practice?
- A social policy dimension — how can those least likely to access the technologies get to enjoy the benefits? For example: the socially disadvantaged, indigenous people and others in remote schools.
- How do we better embed ICT so that we "get it right" from pre-service through to in-service professional development?

Powell highlighted the potential of the internship models of school-based practice offered to some pre-service teachers. In this model, graduating pre-service teachers are able to work in schools as colleague teachers for extended periods. The PICTL model offers opportunity to focus that time and use new, engaged, pre-service teachers as the stimulus for the development of new ideas. He identified projects that had implemented such a model and suggested more opportunities were available. He proposed that participants in the forum should debate the extension and adaptation of internships and similar structures for pre-service teachers' activity in schools, suggesting it was an area of national strategic interest.

Keynote address two: PICTL initiative — purpose of the forum

Ralph Leonard, ACCE

Ralph Leonard referred to *Making better connections* (Downes et al., 2001). He highlighted how the two phases of teacher development — pre-service teacher education (PTE) and continuing professional development (CPD) — are treated separately in this report, reflecting their separate treatment in policy and practice. The report recommended that the two should, in future be treated as coherent parts of a single continuum:

> The main concepts are that professional experience needs be reconceptualised, that professional experience time be increased and that it be a shared responsibility between schools and universities. (p. 17)

Further, that partnerships …

> …could well provide 'the meeting place' where both schools and universities, both practising teachers and teacher educators, could combine their expertise for the benefit of both the students in classrooms and the student teachers. (p. 18)

This position was also supported in Ramsay (2000) who suggested increased time and more shared responsibility of both universities and schools for pre-service teacher practical experience.

One of the major findings of this PICTL study was that scarce teacher-education resources are, in effect being under-utilised through the lack of coordination between PTE and CPD activities. This study, Leonard stated, explored ways to make these two phases work better together.

Both reports identified the link between the use of ICT and school reform. Leonard, using the following quotes from *Making better connections*, highlighted the interconnectedness of the reform agenda and the use of ICT for learning. These recommendations and findings were the triggers for the PICTL study:

> 2.3…systems and institutions should direct their focus to outcomes that clearly link the use of ICT in classrooms to broader school or institutional reform issues. In this way both the purposes and the effective practices are embedded in the notion that schools need to change in order for the effective learning of teachers and of students and thus the effective use of ICT for such learning. Furthermore, it identifies the possibility that clear links are needed between the notion of effective learning for student teachers and more broad reform of teacher education institutions and programs themselves. This is a significant finding, because to date most of the literature in the field of ICT and teacher education focuses on discussion of the relative effectiveness of the separate subject or the infusion model. (Downes et al., 2001, p. 22)
>
> 8.1.2 Developing capability
>
> Governments, systems and teacher education institutions and professional associations work collaboratively to develop:
>
> - partnerships between teacher education institutions, school systems and local school districts in regard to professional experience that integrates the use of ICT for teaching and learning and professional support.
> - partnerships between teacher education institutions, school systems, local districts and schools such that the expertise within the university, the school and the student teacher cohort can be combined in projects that lead to the enhancement of student learning outcomes and teacher development within schools with regard to the use of ICT for teaching and learning…
>
> 8.1.3 Mechanisms and incentives…
>
> - National funding be provided to a number of consortium, one from each state and territory, to develop, trial and evaluate forms of partnerships between universities, systems and schools that address issues of system reform of school, teacher-education programs and the continuing professional development of teachers for the purpose of improving student outcomes through transforming teaching and learning environments with ICT for students, student teachers, practising teachers and teacher educators. (Downes et al., 2001, p. 80)

He indicated the key underlying principle of the PICTL study, which had its foundation in these reports, is to "develop, trial and evaluate forms of partnerships between universities, systems and schools" (Downes et al., 2001, p. 81).

Two key issues were identified in these reports that would be addressed by the PICTL study:

- Schools where student teachers are placed do not have the resources, expertise or pedagogical practices to help them learn to use ICT effectively.
- Pre-service teachers don't have the appropriate ICT and teaching skills when they arrive at schools.

These issues would be addressed by the PICTL study through a range of individual projects aimed at building capability by developing partnerships between universities, systems and schools.

Leonard acknowledged the project partners:

- Project management
  - Australian Curriculum Studies Association (ACSA)
  - Australian Council for Computers in Education (ACCE)
  - University of New England — The National Centre of Science, Information and Communication Technology, and Mathematics Education for Rural and Regional Australia (SiMERR).

He also highlighted the important contribution of the Department of Education, Science and Training (DEST) and the Steering Committee which is comprised of representatives of:

- MCEETYA ICT in Schools Taskforce (Gillian Dellit).
- Australian Council of Deans of Education (Dennis Goodrum).
- Teaching Australia (Kathryn Moyle).
- DEST, eLearning Section (Louise Wells and Louise Hanlon).

The PICTL study is funded by the Australian Government Quality Teacher Programme.

For those present who were not project members, Leonard described this national project which is made up of eight unique state/territory projects. Each had the freedom to design its own implementation, building on internal partnerships and fostering new ones. They differ in a range of ways including:

- Elements of teaching practice.
- Management locus.
- Style of professional experience.
- Nature of internal partnerships.
- Research questions addressed.

To enable guests to keep in touch with participants, a brief reference was made to the PICTL website located at http://www.pictl.edu.au

Leonard stressed the importance of seeing the forum as a step in the process, not an end point.

Over the two days the whole community needed to address the questions:

- What is transferable?
- What is sustainable?

He outlined the forum objectives:

- To foster the sense of community.
- To gather evidence and insight from local projects.
- To look beyond the narrative to see the emerging national issues.
- To identify the successes that can be applied elsewhere.
- Not to be an end-point but an integral part of the project development.
- To provide essential information to the national project research and report.

State and territory project presentations

The state and territory forum reports are available on the project website at http://www.pictl.edu.au/Content/Item_1242.htm. Details of the state and territory projects can be found in this volume.

Emerging issues

A roundtable discussion was held using the Zing Conference System to gather the ideas generated by the groups.

The following questions were used to guide the discussion:

1. What are the main issues emerging from the project?
2. What are the national emerging issues?

What are the main issues emerging from the project?

Issues were drawn from the eight state and territory projects and provided considerable insight into local design and the context into which the projects, or similar school-based projects, need to be implemented. Many ideas were expressed, but not always explored. These are summarised under the following headings: Pre-service teacher perspectives; Teacher perspectives; university perspectives; Project design; Culture/attitudes; and Policy implications.

Pre-service teacher perspectives

- Pre-service teachers misunderstand PICTL project goals.
- Pre-service teachers can't access school networks and do not have sufficient and necessary digital access rights from on-campus or home prior to their school visits.
- Difficulty of finding suitable placements for pre-service teachers in schools.
- Pre-service teachers, especially mature-age students, want to use ICT and PICTL-style projects in schools.
- Desirable for pre-service teachers to be recognised as part of the community of learners.
- Incentives needed for pre-service teachers to undertake activities which do not result in academic credit.
- Extra stress placed on pre-service teachers.
- Pre-service teachers are looking for positive ICT-using role models.
- Varying views on relative importance of ICT, especially in the practicum. Pre-service teachers question the relevance of using ICT when it is not fully integrated into the schools that will employ them. Most valuable learning occurs in the university setting and is supported in systems' policy and curriculum documents, yet pre-service teachers are finding it is not desired or supported in schools.
- Mature-age student backlash against using Web CT and online discussion. Pressure to log on and read other students' opinions but there is not sufficient depth. There needs to be contributions from, and leadership by, lecturers.

Teacher perspectives

- "Luddite" teachers, with their limited use of ICT, are not positive role models for pre-service teachers, but for some this attitude is acceptable in schools.
- Teachers portray the use of ICT as an "extra".
- What is the aim of ICT pedagogy integration? There is a lack of clear direction.
- Recognition about the effect of the "ageing" teacher workforce — perhaps less open to change and less open to mentoring new teachers.
- Incentives needed for teachers to undertake professional learning.

University perspectives

- Lack of quality placements for pre-service teachers and the need for good examples and role models. Access to schools is becoming more restricted, as are places for practice-teaching sessions.
- Resourcing partnerships is challenging, especially in regional and remote areas.
- Conflicts for competing time make it difficult to be in schools.
- Support networks for academic and project staff are important. The education systems (including regional and CAP) can be strong support networks.
- Who in a university can take this forward? The university structure does not have spare staff or staff capacity.
- The number of teachers, schools and universities required to maintain this scheme makes the balance unachievable. Scaling is an issue. universities can not cope with the scale of teacher preparation and it is not "cost effective".

Project design

- Tension between being part of the coursework and professional experience program.
- The "practicum panacea" culture of the project needs rethinking. Is practicum the solution? Are practice-teaching sessions, as they currently exist, even necessary? If this was considered from a community of learners' perspective, what sort of solution can be found? Opportunity for the community to reconsider the structure of pre-service teachers' in-school experience.
- Practicum as a more collaborative partnership — not a field experience but a professional experience. Perhaps a mentoring program not attached to a specific teacher, but within a whole school.
- Analogy of work-experience versus structured workplace learning (quality partnership with well defined roles from which all partners benefit).
- Focus on multiliteracy approaches and cognitive depth in projects.
- Encourage more creative projects.
- Investigate the educational potential of online environments.
- Using sessional staff from universities is not sustainable because budgets do not extend beyond casual part-time staff for this activity.
- Supervisors versus liaison people — who and what role will be the best support model for pre-service teachers in schools.
- Allow more full time staff.
- No alignment of school and university calendars.
- Partnerships are highly valued and have significance in all the forms they can take.
- Time to develop relationships is needed.
- In projects using ICT "one size does not fit all".
- How can ICT be more effectively used in practicum support especially when long distances are involved?
- Quality of the partnerships varies in value. Define the roles and expectations of the partnerships.
- The emphasis on partnerships may be misleading. Networks may be a better description of the relationships among people. Communities of practice offer a different perspective on what happens, given the flexibility of focus.
- Need to have an integrated approach to pre-service teacher learning to embed technology in pedagogy and not just develop ICT skills. However, skills are important. For example, file management in schools is most important and people need skills to help classes work on school networks.
- PICTL is a catalyst for transforming learning, but the nature of a PICTL project is that there may be benefits which occur because of the research element — a Hawthorne effect.

Culture/attitudes

- How to change the relationship between schools and universities so that pre-service teachers are seen as a resource and not just as people to be taught how to teach?
- Reconceptualising the mind set of teachers to accept pre-service teachers and then to accept them as co-learners.
- Redefine the nature of professional relationships.
- Concern about the cost-benefits of embedding ICT may provide sufficient justification for not using them in schools.
- Incompatible expectations between schools and universities.
- Create the value to encourage participation and attitudinal shift.

- Sensitivities about pre-service teachers being seen as experts as this sometimes leads supervising teachers to feeling inferior. Can co-learner models be developed?
- How do all educators keep pace with technological environments and change?
- Positive effect of projects on teachers who were involved.
- PICTL studies are really a change-management process where conditions for change are supportive.

Policy implications

- Issues of access to ICT environments for all stakeholders — interoperability; need for collaborative environments to be web-driven. Bandwidth concerns in rural areas.
- Reviewing ICT restrictions in schools and poor scope of software.
- Encourage institutions to be more flexible and responsive to the adoption of emerging technologies. Policy to test things thoroughly before systems implement.
- Lack of incentive for embedding ICT into teacher education. Difficulty in convincing the university to incorporate this when the systems don't require it.
- Make active links to professional standards.

Conclusion

There appears to be an unevenness of ICT integration into curriculum and pedagogy in schools. This may explain in part why there is a shortage of positive and powerful role models for pre-service teachers. Further, the absence of authoritative policies creates a culture that using ICT in school is neither "necessary" nor expected. Universities are questioning why they need to attend to ICT when there are no requirements to do so. There was some discussion around the common belief that pre-service teachers and teachers consider that using ICT is "extra", unusual and special. All of these perceptions are at odds with the spirit of PICTL, which suggested pre-service teachers should be using ICT in schools and their supervising teachers should be supporting them as they do so. The assumption that ICT is well used in schools may be drawn from the celebrated work of the early adopters, enthusiasts and "seasoned" ICT-using educational communities. Pre-service teachers and teachers in these projects suggest this is not yet mainstream practice despite the significant resources that have been committed to making it so.

The strongest issue for pre-service teachers identified by Zing sessions has been the difficulty of gaining access to school ICT networks and services. Considerable attention must be given to providing pre-service teachers and their lecturers access at universities and in homes. Access to services, help and opportunities to add to networks, install software and manage control is essential if pre-service teachers are to take leadership roles. Pre-service teachers were generally of the opinion that there were many barriers to their use of ICT in schools. Teachers in the forum did not raise this as an issue at all. They were more aware that teacher attitudes to technologies, innovation and change are complex, and problematic when PICTL-style projects need to be hosted in school sites. Among them is the suggestion there is a need to improve teacher attitudes to hosting pre-service teachers, to address the lack of incentives and to balance the general perception that pre-service teachers require additional work.

For university staff, the spirit is willing and individuals can do much to use experiences within PICTL studies to improve local programs. The universal concern seems to be that universities are struggling to survive and that cost of policy changes and the reductions in staffing and program budgets have led to the situation in which capacity to adequately staff programs is very limited and, for some, seemingly impossible. Full-time staff specialising in ICT are rare in education teams and universities have marginalised education faculties as they struggle with demands for rationalisation.

With regard to program design, two issues emerged. Firstly, the PICTL model intended to use practice-teaching segments as the in-school opportunity to host this dual model for professional learning. Experiences in the project have brought that assumption into the spotlight and raise questions about whether the characteristics of practicum, where pre-service teachers need to "pass" and are examined, provide a positive culture for experimentation and exploration. Secondly, using a variety of models for in-school experience and project-based learning needs further debate and discussion.

What are the national emerging issues?

Attendees were asked to "step outside" their local projects and to project their data and opinions into a national perspective. Issues discussed are summarised under the following headings: pre-service teacher perspectives; teacher perspectives; university perspectives; project design; culture/attitudes; and policy implications.

Pre-service teacher perspectives

- In some states there is an oversupply of teachers; in others there is a shortage. National approaches seem necessary, but each state focuses on its own system. The issue is complex.
- Pre-service teachers need access to schools' ICT facilities at university and at home. They need to have the same access as teachers to services. With "smart" classrooms and school computers going into homes, pre-service teachers have inequitable access and have difficulty working with students and teachers.
- What are the universities accountable for? Innovation can put pressure on students and increase drop-out rates. The argument that "using ICT is more work" is not accepted by all students. Those who engaged in PICTL do not believe that, but those who did not, share that belief.
- Competing pressures for pre-service teachers' time changes the culture of pre-service teacher education programs.
- There is a need to maintain a balance between online learning and face-to-face contact. Online learning should not be seen as a cheaper or convenient option.

Teacher perspectives

- Avoid the syndrome of change for the sake of change. Establish the purpose and value of change.
- Defining "learning" in a consistent way would assist teacher learning.
- What is the expectation of teachers' knowledge and use of ICT? Curriculum reform can define this.
- The "chase" for the latest technology is not always essential or practical in schools.
- There is a perception that ageing teachers and teacher educators do not have ICT skills, nor do they understand the culture surrounding the technologies, e.g. why children love their iPods and mobile telephones. The teaching workforce needs to "meet" the children of the 21st century and address the digital divide, e.g. inter-generational, rural-urban.
- Learning support and technical support are essential if ICT is to be a viable option in the learning process.
- Personal and professional development for teachers requires time.

University perspectives

- Insufficient resourcing of teacher education. It should be supported at the level of the sciences, given the national importance of ICT in education.
- Flexible resourcing of pre-service training. How faculties are funded and the effect on practicum is substantial. What would happen if universities stopped making practicum placements? Funding for this is a concern in the tertiary sector.

- National issues are related to government policies and what is given priority in universities. Research is paramount to academics because it represents a way for universities to make up the shortfall in funding. The government should identify what it really wants staff to do and fund the institutions accordingly.
- Policies toward higher education are tightly linked to concerns about quality teaching and government projects, but resourcing priorities do not convey a similar message.
- Infrastructure, especially in universities, can not match the level of infrastructure development in schools.

Project design

- There is a lack of consistency across the country and even within states about how teacher education, including the practicum, is organised. The independence of universities to develop programs creates strength in some localities but causes confusion when issues of national importance emerge.
- Insufficient professional-experience placements is a growing concern. There is a need for national action.
- Where is the research/evidence on which to base change or validate existing practice?
- What are the mechanisms to move beyond goodwill within partnerships, practicum arrangements and project-based learning in schools?
- Cultural values about ICT use need to influence program design.

Culture/attitudes

- Learning about ICT is for all educators, not just pre-service students but lecturers and teachers as well.
- Teachers might not supervise pre-service teachers because the pre-service teachers may be disadvantaged in class assessment. Inequity exists in payments to schools for taking pre-service teachers. Is this part of the difficulty in finding placements?
- Teaching, pre-service teacher education and continuing professional development: how can these be linked effectively to support each other? This raises the question of how professional learning is handled by the profession. Varying responsibilities of federal and state governments for professional learning mean that solutions must involve multiple stakeholders and multiple solutions.
- There are relatively few partnerships among professional development providers and universities. There is not enough experience in partnership development and maintenance.
- What is the environment we need to support and sustain? How do we create an enabling environment at a national level that supports the local? What can be done at a national level to support local actions?

Policy implications

- Professional standards must be sustained with consistency across jurisdictions. There is a need to sustain professional teaching standards/competencies. There is uncertainty about significance of emerging national and state professional teaching standards relative to ICT.
- University course evaluation should come from the employers rather than from the students. This would provide arguments for change in a more robust way.
- What is the relationship between PICTL, education systems and university policy makers?
- Would it be preferable for Teaching Australia to be the national voice?

- There is concern about the conservatism attached to current national agendas. A government can delay progress through concern that the "fix" is a complex matter to design and implement.
- Policy and funding for supporting partnership research is confusing. Often reports are not widely distributed if they don't report the results preferred. Funding timelines can negate the impact of the proposed research by the time it is underway.
- Resourcing: some systems are well endowed, some are not. These inequities are not given enough attention by governments, making national collaboration difficult.

Conclusion

Resourcing in universities is strongly represented in the data, with university staff knowing that their current models of work are now unsustainable. The number of full-time staff is such that their influence is eroded and their capacity to meet their own expectations is threatened. Universities also raise the questions about payment to teachers for supporting pre-service teachers, resourcing for infrastructure and the complexity of using research activities to generate funding to make universities viable financial enterprises. Resourcing permeated all discussions.

Teachers seemed concerned at the mixed and incomplete messages from various governments about what they should be doing with ICT in schools, and what professional learning might entail. Pre-service teachers raised the issues of their access to digital resources, schools' ICT systems, and technical support while working in classrooms. The changing national priorities for pre-service teachers mean that time in study programs is tempered by working and lifestyle priorities and this context influences the design of pre-service teacher programs.

Participants expressed confusion over government policy that delivers inconsistent messages. They fear that conservatism of policy that seeks national agreements may be at odds with projects that need to generate exploration and innovation. Creative decisions may be needed to resolve issues.

In this session, participants raised very few issues about the national implications of the design of PICTL-style programs as pre-service and in-service models for learning. There was only one suggestion that overhaul may be necessary.

Day two — a summary

The forum facilitator, Tony Mackay, began the second day of the conference with a summary of the key messages to emerge from Day one:

- The connection between ICT and learning has been strengthened but will need to be argued for and demonstrated rigorously.
- Partnerships and relationships between universities and schools can be enhanced through projects like PICTL.
- Policy can be an enabler or a blocker. We have to address the blockages.
- Communities of interest can grow and teachers can connect to the energy. We are all part of one interconnected system.

Keynote address three: What ARE the data telling us so far?

Michelle Williams, ACCE

Michelle Williams set the stage for the sharing of her data in the context of:

- Assisting to develop debates and dialogue.
- Offering dilemmas in the data.
- Proposing and testing ideas with participants by drawing on the trends of the data.
- Considering policy ideas.

She acknowledged the enormous wisdom about pre-service teacher education among the project officers and how their presentations focused on only one or two issues which they felt were significant. She suggested that the final report on this project needs to focus on the 11 research questions but also provide some discussion on variations of models for simultaneous pre-service and in-service education and practical recommendations. This forum was a venue to test ideas and seek advice on the recommendations for the final report.

Each project was an opportunity to have a "sandpit" to play in and conduct a project with research. By creating a different model of research from that which university peers usually conduct funded by the ARC, the eight state teams were given an opportunity to explore, experiment and take risks without being assured of what the outcome might be. Williams reminded participants that instead of proving the merit of an idea, this was an exploratory project to see what would happen when partnerships were strengthened between schools, universities and educational systems that simultaneously focused on in-service and pre-service education.

Drawing on the Australian Government Quality Teacher Programme research in Queensland (Williams, 2004), she used the Professional Learning Purposes Key as a framework to describe the professional learning within the PICTL studies. This key suggests that there are four categories into which all professional development can be grouped. These are:

- Awareness raising
- Buy in
- Mainstreaming
- Celebration and sharing.

Williams went on to clarify the role within the PICTL study of Action Learning, Action Research and Mentoring. These designs were developed to support learners as they implement in the field. Intensity and deep insightful reflection are two concepts within these designs that are important to consider when choosing research methodology. Williams drew attention to the use of some terms in research interviews that highlighted differing definitions of such. One important example was Action Learning — a cycle of planning, action and social reflection — that was often mistakenly used for describing just doing something (having an in-school experience) rather than the rigorous cycle of true Action Learning.

Her first analysis of the data collected is presented below under several themes.

Partnerships and stakeholders

Williams identified partnerships at two levels:

- Institutional/systemic level — some of which were well-established, as in WA where Memoranda of Understanding already exist, and some are new.
- Between the individuals.

She identified three distinct stakeholder groups involved in learning what to do with ICT in curriculum and pedagogical frameworks and teacher pre-service education in relation to this.

- Pre-service teacher, teacher, university lecturer.
- Universities and schools.
- Systems at the national state/territory level and Catholic and independent.

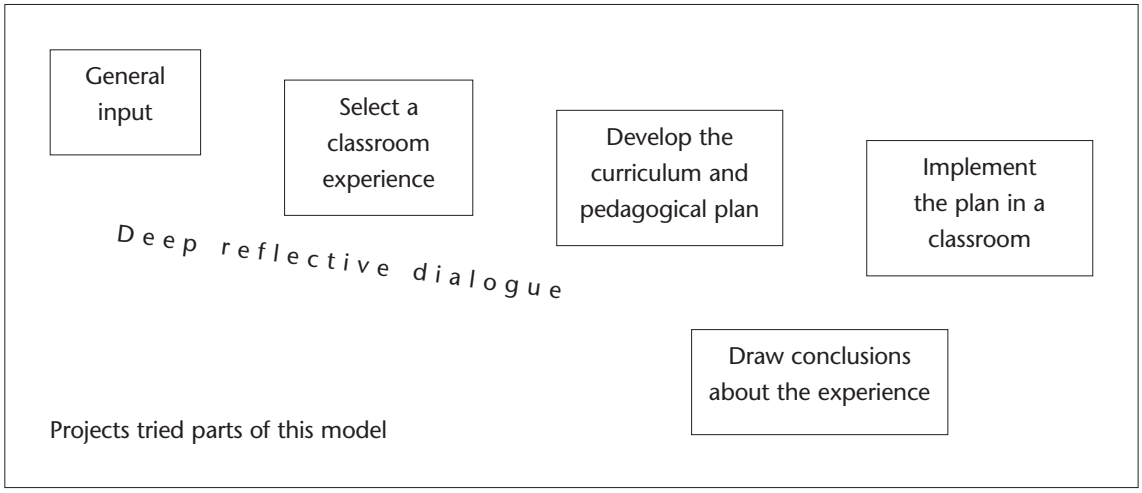


Figure 1. PICTL model

By ascertaining the structure of an overall model that allows everyone to talk about their unique experiences, Williams was able to use some common elements and language to describe the themes, issues and learning emerging from the projects. The elements of the model, shown in Figure 1 were:

- general input and learning;
- select a classroom experience — selecting a quality idea with curriculum and pedagogical depth;
- develop the curriculum and pedagogical plan;
- implement the plan in a classroom;
- learn to reflect deeply while implementing — not just at the end;
- draw conclusions about the experience — talk and reinvent;
- deep reflective dialogue across all stages.

Williams used an Input-Processing-Output model of data collection to investigate the design of the input, identifying practices during implementation and gathering results and implications. After acknowledging the project officers who had hosted her during data collection, Williams presented a picture of the data analysis using a PMI (Plus-Minus-Interesting) strategy.

Inputs and design

Williams highlighted the link between the purpose of the professional learning and the target audience and the subject matter and design. At the beginning of this project it was anticipated that the intention was to build an in-service model of teacher professional learning and a pre-service model of teacher development, and to implement them simultaneously as recommended in *Making better connections* (Downes et al., 2001). Many projects about mainstreaming ICT were developed and drew heavily on the *Pedagogy Strategy: Learning in an Online World* (MCEETYA, 2005).

Some projects involved fostering innovation in pre-service teachers as leaders of the future. Williams noted the opportunity to develop some specialisations in pre-service teachers, such as Media Studies and Computer Studies, those disciplines that have high levels of ICT in secondary schools. These were opportunities that were not available to students in a "normal" practicum.

Input before the in-school experience varied, often relying on the synergy of the stakeholders to provide considerable scaffolding. The SA model was noteworthy because in it the pre-service teachers had intensive preparation when it was needed to support their colleague teacher. Whereas in Victoria and NSW the success of their model is attributed to the quality of their initial preparation sessions that happened prior to the classroom implementation.

Where there were strong pedagogical and curriculum frameworks within the systems that were in use in the project schools, such as Learning to Learn philosophy of NSW, the New Basics in Queensland, and the Essential Learnings in Tasmania and Victoria, the calibre of project design was more sophisticated.

Design of reflection

Reflective practice needs to be mentored and scaffolded, because pre-service teachers and teachers who are new to using ICT don't have the depth of experience to be reflective without support. This needs to be a hands-on approach with guidance from a mentor. There needs to be support not only for private reflection, but also for reflection in groups. This reflection is not only about curriculum plans and pedagogy but also about the learning journey of the pre-service teacher and the teacher.

Cost of time to participate

Paying for teacher time for co-planning and meetings was an expectation built into most projects. The question arose, "Is university lecturer time free?" When projects were in addition to and not part of daily work, their time was not free. The same question was posed about pre-service teachers, since they were giving up time they could spend on other subjects for assessment, or with their families or working for an income.

Expectations

For the project, high expectations for the quality of classroom experiences must be built in. It appeared that expectations were realised, whether there was an assumption of success or conversely, if failure was anticipated. Positive attitudes and a "can do" approach led to people overcoming barriers and succeeding.

The pre-service teachers consistently commented on the pressure of the unrealistic expectation that they could plan ICT into school programs when they have never seen any examples of it in practice during their previous experiences.

Culture of innovation

Innovation is a risk and hard to achieve in an assessment environment. There were many comments from the pre-service teachers about the tension between taking incremental steps and being highly innovative. (See Colin Baskin's paper about the Queensland project for a good explanation of this.) There was frustration at times about the low level of innovation possible and the factors working against innovation. The question was whether each project was mainly a pre-service teacher–education model or mainly an in-service professional-development project. Pedagogical change was seen as necessary yet the pre-service teachers being assessed on practicum felt that it was too risky for them to be the "messengers" about need for change.

Technical policy

Every interviewee mentioned the technical constraints on innovation. Policy regarding access to each other's ICT system is significant in all projects, but beyond that, the lock-down on school systems has been crippling for many innovative practices.

To prac or not to prac

One key decision facing all projects was whether or not to use the practicum experience to host the project. NSW, VIC, ACT chose not to use the practicum; WA, TAS, NT, SA did use it. QLD used both with many activities inside and outside the practicum.

Pre-service teachers felt that their practicum assessment may be jeopardised by taking the role of a change agent or innovator. There was also a view held by some pre-service teachers that using ICT is not mandatory in schools so why should they bother.

Culture of accepting pre-service teachers in schools

Can projects like these create a need to have pre-service teachers and university staff and others in schools? Those who do it find it professionally rewarding for themselves as teachers. Is there a need to foster a culture of developing the next generation of teachers as the responsibility of all teachers, not just a willing few?

Williams concluded with an invitation to use the following discussion sessions to address the issues, themes and trends identified in this preliminary analysis to delve deeper into the research questions and their implications.

Panel discussion: From the projects — a personal perspective

A panel comprising teachers, pre-service teachers and project coordinators discussed how this model of professional learning had worked. The panel members were:

- Lisa Jones, University of South Australia, SA.
- Bruce White, University of South Australia, SA.
- Kylie Butler, University of New England, NSW.
- Michelle Blakely, Carramar Primary School, WA.
- Michael Carstens, James Cook University, Cairns, QLD.
- Colin Baskin, James Cook University, Cairns, QLD.

Lisa Jones listed the keys to success as she saw them in her context. These included the opportunity for pre-service teachers to gain access to the Education Department's professional learning opportunities through The School of the Future (TSoF), and experience with the system's online environment. Without this prior access, the pre-service teacher would not have had the familiarity with the systems to make the school experience effective. The project formed part of the normal coursework rather than being an extra and this was seen by Jones as another significant factor contributing to the success of the project in their setting.

Bruce White supported Jones' conclusion that making the project a part of coursework contributed to its success, stressing that adding anything extra into the practicum experience was "a recipe for disaster". White drew attention to the nature of assessment in a practicum school situation, suggesting it was essential to maintain the capacity of the teacher to pass or fail a student as needed. He referred to the need for a learning-community model to have a more level power structure which may not be appropriate in an assessment setting. He also made reference to the benefit to small and rural schools in gaining professional learning about ICT from these pre-service teachers when they demonstrated new skills and techniques. This evoked some comments from the audience in relation to the intent of the school experience and whether this was an appropriate emphasis for the pre-service student. This concept was also challenged by other audience members with the suggestion that all participants in the profession were lifelong learners who would benefit from the experiences brought to the setting by the pre-service teacher.

White also highlighted the reluctance of many teachers to accept responsibility for having pre-service teachers, suggesting that this could be improved by having other relationships develop between pre-service teachers and schools. These might include the pre-service teachers conducting professional development about ICT. He suggested schools could be a context for a range of activities that pre-service teachers do, that include both the practicum and projects.

Kylie Butler, a pre-service teacher, highlighted the effect on her personal learning provided by the reality of experiencing the use of ICT in the classroom by both innovative teachers and the children. She felt she had started out with unrealistic expectations of the simplicity of teaching as a profession. Having access to mentoring by the teachers led to personal growth and confidence.

Butler highlighted the positive benefits of the project centred around the professional exchanging of ideas between pre-service teachers and teachers:

- Applied theory in practice in the school setting.
- Experiential learning: working as a team as opposed to writing late night essays.
- Meeting teachers who were innovative and refreshing.
- Seeing the plan come to fruition in the students' final projects on the sharing day.
- Gaining an employment edge over other pre-service teachers by participating in an optional program and adding this experience to both portfolio and resume.
- Building closer networks with colleagues in the university and the school.
- Fun and engaging activities.
- Benefits were gained for all who participated.

Michelle Blakely gave the perspective of a teacher working in a new school with state-of-the-art technology and teachers selected on merit for their ICT skills. Although there was an expectation that ICT would be integrated, the reality did not always match the policy. Teachers were confronted with competing priorities in a new school, and ICT integration was only one aspect. Teachers' unrealistic expectations of the skill level of the pre-service teachers led to some failures where technical or logistical problems could not be overcome.

Blakely stressed the importance of the existing relationship between the school and the university in providing an established communication channel, especially when the project had such short timelines. This was seen to contribute to the success of the project in this school for pre-service teachers, teachers and students. She also stressed the essential role of good pedagogy in achieving worthwhile outcomes for both the pre-service teachers and the students. She felt the lack of a group-sharing event at the end of their program had been a missed opportunity.

The whole experience prompted Blakely to pose these questions:

- What is the role of ICT in pre-service teacher education?
- Based on the commitment of all education systems to the importance of ICT in students' education, should ICT be a part of *all* pre-service teacher education programs rather than an elective?

Michael Carstens started the project as a pre-service teacher in 2005 and took on a Project-Coordinator role within the overall program at James Cook University in 2006. He described the broad terms of reference in this implementation. The only constraint was that the projects needed to meet an expressed need from a teacher in the participating school. To this end, a resource was constructed but the teacher subsequently chose not to use it.

In this situation the project formed part of an independent study unit rather than part of the practicum. Carstens felt he would have found it much harder to be innovative with the project if assessment during a practicum had been involved. Other challenges included gaining access to the system by an "outsider", as only employees are given usernames and passwords.

The appointment of a project coordinator had led to better outcomes. This allowed for effective communication, conflicts to be dealt with, logistics to be managed and support for achievement of concrete outcomes in a timely manner. The pre-service teachers have created a useful resource that should have an ongoing life if support is maintained.

Colin Baskin used the project to address the question:

> What would happen if we let pre-service teachers have share of the leadership of ICT integration in schools?

The sustainability of any project was a key concern due to a high turnover of teachers in the schools involved in this project. Drawing on the work of Wellman (2001), who describes the global proliferation of communities as loosely-constructed groups that occur to meet needs, this project tapped into the local and online networks that support these teachers rather than targeting specific individuals. The project developed resources that could be used in the longer term. Baskin highlighted the importance of the on-going management role needed to ensure sustainability and prevent projects and their products fading over time with changing staff.

Baskin raised these questions:

- What is the definition of ICT in schools?
- Can we design for this environment?
- Can we design for standards?
- Can we enforce standards and competencies?
- Are the processes being put into place to improve student learning through the use of ICT leading to the expected outcomes?

Audience discussion addressed the diminishing number of teachers willing to take pre-service teachers for practicums. Policies and reward systems around this process were identified as areas needing greater attention if the pool of placement opportunities was to be maintained or expanded.

Analysis

Factors affecting success:

- Existing relationships between the university and the schools supported success.
- Short timelines increased risk of failure and extraordinary measures had to be taken to address this problem. These included a lot of good will by teachers, lecturers and pre-service teachers in working long hours to meet deadlines.
- Ongoing management is needed if projects are to be mainstreamed and sustained.
- The lack of places available for placement of pre-service teachers was likely to make widespread implementation of ICT-focused projects unlikely.
- The elective nature of ICT in pre-service teacher education programs.

Round-table discussions — looking ahead

A round-table discussion was held using the Zing Conference System to gather the ideas generated by the groups.

The following focus questions were used to guide the discussion:

- How can teaching and learning environments in schools and universities accommodate partnerships?
- What change is necessary so all stakeholders can develop and improve the use of ICT in new curriculum frameworks?
- How can this work move from project-based "trials" to mainstream practice?
- What is the link between effective professional development and whole-school or system-wide reform?

How can teaching and learning environments in schools and universities accommodate partnerships?

The Zing technology, as a rapid-recording system at the forum, promoted gathering first impressions and ideas.

The discussions are summarised as follows.

Infrastructure to support partnerships

- Projects need a strategic agreement at a high level in the respective institutions.
- Although partnerships work at the "people" level, they need to be facilitated at system and university-governance levels as this sets boundaries, enables resource provision and establishes accountabilities.
- Access to appropriate resources and incentives is necessary.
- Time for people to establish relationships and work together is needed.
- Partnerships need to work within existing relationships, procedures and structures rather than establish these anew.
- Connectedness between lecturers, teachers and pre-service teachers at technological and other levels must occur. A policy is needed which enables full-access logons to digital environments.
- Develop salary/award structures to encourage participation by teachers and lecturers who would receive tangible benefits from these.
- Include boards of registration in the mix to enable teachers to "count" working with pre-service teachers in "learning" projects as professional learning.

Nature of the partnership

- More flexible models for pre-service teacher education are needed.
- Pre-service teachers should have ongoing relationships with a school, not just through a practice-teaching experience.
- Professional development of teachers is the key linkage between universities and schools.
- There is a diversity of participants in the participating organisations.

Goals of partnerships

- Reinvent the university-school relationship through community outreach programs.
- There must be sustained purpose.
- Do we need partnerships? What alternatives ensure more open access between universities and schools?

Culture of cooperation/attitudes

- Create a shared understanding and acceptance of all stakeholders' priorities and investments in the partnership.
- Identify mutual benefits and establish trust.
- The professions continue to learn and grow through partnerships; personal growth depends on relationships.
- Instil a determination to make the relationship enduring.
- Encourage openness.
- Need to achieve and manage the "talk" about having pre-service teachers in schools; consider the good and bad press.

Conclusion

The data gathered in this Zing session do not provide any significant insight into the question, "How can teaching and learning environments in schools and universities accommodate partnerships?" The responses did not address how universities might accommodate partnerships. For schools, opening up technological environments for lecturers and pre-service teachers was a piece of concrete advice. There was evidence that this expert group believed that agreements at the highest levels of involved institutions and systems provided opportunity to formalise the incentives and benefits such as salary recognition through adjusting award structures. Registration levels of teachers could be assisted by recognising strong, collaborative projects as significant forms of professional learning.

What change is necessary so all stakeholders can develop and improve the use of ICT in curriculum frameworks?

It is difficult to extract from the responses whether attendees focused on changes to improve use (levels) of ICT or if quality of ICT was the primary concern. Attention to curriculum frameworks was scant. The question was designed to see beyond using ICT per se, to draw attention to implementing new curriculum frameworks where ICT is increasingly embedded in the design of the curriculum programs and integral to their nature and purpose.

The discussion is summarised as follows.

Infrastructure to support changes

- Conduct research to monitor progress and to provide information for further projects and directions.
- Conduct research on accelerating learning through use of ICT.
- Embed ICT competence within professional standards documents.
- Offer appropriate professional development.
- Resource professional learning offered, and then coordinate at national, state and local levels.
- Providing laptops for teachers and principals does the most to change understanding of the potential of ICT.
- Move beyond standard operating environments and restrictive software offerings to enable creativity and change.
- Remove the barriers of national competency testing of students. The tests produce a reduced and incomplete understanding of ICT use in curriculum change. This is not a positive model of new ICT use in schools, in fact, quite the opposite.
- Clearer understanding is required of what excellent ICT-use classrooms look like — through examples and celebrations of such.

- Identify good practice and link it to learning theories to draw attention to the values inherent in new curriculum frameworks.
- Seek good press: use podcasts, video clips and other media to show the good examples in practice and make them accessible to pre-service teachers and teachers.
- Provide greater technical assistance to project teams in schools and classrooms.
- Create trusted access between systems. Provide innovation servers where innovators can explore ideas before they are mainstreamed.
- Enable easier access to ICT-rich curriculum resources and support for stakeholders.

Nature of the changes

- The whole-school approach with strong leadership creates a culture of change, in contrast to classroom change resulting from the PICTL study partnerships. Increased evidence that multiple pre-service teachers, university staff, and teachers may be effective in developing change.
- The use of effective ICT frameworks, curriculum interpretation, pedagogy and assessment all require change.
- To enable curriculum change it is necessary to improve the cost-benefit analysis through scaffolding, networking and modelling. Pre-service teachers should also adopt this role. This is not just the domain of the leading teacher.
- University models for teaching need to be more constructivist and use ICT in the process.
- Build ownership — beyond the survivor syndrome and situated champions towards capacity building in curriculum areas.
- Change structure, pedagogy and assessment to allow ICT innovation.

Goals/purposes of the changes

- Develop more constructivist practices while using ICT.
- The curriculum reform can drive changes in the kind of ICT experiences children have in schools and pre-service teachers can lead this.
- Embed ICT use in the pedagogy of all stakeholders in classrooms.

Culture of change/attitudes

- Improve understanding of the different roles of the stakeholders.
- Make the expectation that teachers use ICT explicit in many ways.
- Require a culture of high expectations, but also value diversity and difference.
- Develop a mindset to create a climate that values and recognises collaboration.
- Build a culture of change in the profession.

Conclusion

There is a sense that development of ICT use in schools is restricted by inadequate examples of exemplary pedagogical practices, inadequate ICT environments in schools (restricted and restrictive environments that do not foster innovation and change) and perhaps, poor interpretations of the role of ICT in the curriculum framework. Participants wanted to change this by providing examples, improving the culture of change, explicitly linking changes to what ICT is used for, and how it is used to theories of learning which underpin the new curriculum frameworks. A common response was to "raise the bar" on expectations of teachers, pre-service teachers and lecturers to use ICT in powerful ways within the intent of the new curriculum frameworks and to give authority to this expectation.

There were also very clear responses to required changes, including giving emphasis to the curriculum frameworks themselves as drivers of change. The curriculum frameworks need to clearly articulate the broad intent of ICT use in schools and the belief systems which underpin these. Further, teachers need to understand these and link what they do with ICT to this, using conversations to underpin changed practices in classrooms. There was very little discussion on changes to university approaches, except for modelling courses and programs and suggestions for changes in emphasis of research.

How can this work move from project-based trials to broader practice?

This question was designed to identify, firstly, the conditions under which the simultaneous professional learning models could be extended and secondly, any visions for what "mainstream" practice might look like.

Responses are presented as follows.

Infrastructure to support changes

- Provide additional funding to mainstream this model.
- Provide greater balance between research, teaching administration and community responsibilities in both schools and universities. The loss of resourcing for the infrastructure to manage schools and universities means teachers and lecturers are distracted from core business.
- There is need for a "knowledge-management frame" that identifies and organises knowledge about pre-service teacher, teacher and community experiences of ICT.
- Boards of teacher registration can embed ICT competence into teacher registration to support university efforts and make expectations explicit and meaningful.
- Disseminate information about the positive influences of this project on schools and universities.
- Provide incentives and resources for participation.
- Provide pre-service teachers with access to laptops as tools of trade.
- Eliminate the digital divide by using end-of-life equipment coming out of schools for pre-service teachers.

Nature of changes

- Concept of sites where professional learning can occur, e.g., "teaching schools" (like "teaching hospitals").
- Consider a range of alternative models for professional experience.
- The national project provided some structure — funding, national focus, national coordination, timelines with specific outcomes, project manager visits, online evaluators and a summit. These may be the necessary conditions for mainstream national change.
- Reinforcing the learning cycle with supported reflection (planning, guided reflection, mentoring and experimentation) in a safe environment. Is current model of the practicum useful for this? Distinguish between accreditation (reporting) and learning (development process).
- Establish mainstream problem-based learning in all stakeholders' learning programs including all professional-experience programs.
- Conduct ICT skills testing for entry of pre-service teachers and test ICT and pedagogical experience on exit from programs. These will set an expectation.

Goals/purpose of the changes

- To establish a culture where pre-service teachers in schools undertaking defined cooperative projects are a learning model for all stakeholders.
- To intensify the projects undertaken by teams and to work with more teams.
- To provide opportunities for pre-service teachers to learn to teach in online environments as well as in face-to-face environments.
- To resolve the tension between accreditation and reporting on what stakeholders do and provide a safe learning environment.
- To embed ICT in the curriculum, mainstream ICT in classrooms.

Culture of change/attitudes

- Need to have low entry and "scale up" gradually so not to "shock" systems and schools. Do not work too quickly with schools.
- Establish a culture wherein pre-service teachers can be involved in school-based projects with teachers.
- Build awareness of successes and positive effects of these PICTL projects.
- Alter the relationship between schools, teacher educators, systems and universities — client/service/continuity/benefit to the whole community and the profession.
- Promote liaison between key school personnel (ICT integration and professional development officer) with university lecturers to promote cross-fertilisation of ideas.

Conclusion

In answering the question, how can the projects and general model in the trials be extended, expanded and become mainstream practices, participants offered suggestions and contexts in which such strategies might be implemented. The conclusion that not all schools are suitable sites for such projects is strongly evident, perhaps leading to the suggestion by one team that teaching schools (metaphorically described through the teaching hospitals example) may be a useful context for professional learning.

It appears that the model of working in discrete, structured projects within the support network of partnership stakeholders has capacity to be offered more frequently to more groups. The quality of projects needs to be elevated to reflect the capacity of the model. The national infrastructure supporting the people leading a suite of state and territory projects attracted attention, suggesting perhaps, that a national network of "teaching schools" could be valuable.

The basic assumption of this expert group was that ICT use in schools improves and changes the learning of students, but that there is a responsibility on stakeholders to design effective learning experiences with ICT if learning potential is to be realised. It seems to be accepted that this PICTL model provides opportunities for all stakeholders to learn to do that. Mainstreaming such practice, making it an everyday experience, must be converted into action plans and resources.

Expert panel: Testing propositions emerging from the forum

Janine Bowes, Department of Education, Tasmania.

Geoff Romeo, Monash University, Victoria.

Debbie Kember, Department of Education, Queensland.

Cathy Crook, Belconnen High School, ACT.

Janine Bowes

With reference to the *Making better connections* report (Downes et al., 2001) which has led to this PICTL study, Janine Bowes described the different uses for ICT in learning and quoted from the report to clarify the four identified reasons for promoting ICT use in classrooms.

Educators are promoting ICT use in classrooms for several distinct reasons. These include:

- Type A: encouraging the acquisition of ICT skills as an end themselves.
- Type B: using ICT to enhance students' abilities within the existing curriculum.
- Type C: introducing ICT as an integral component of broader curricular reforms that are changing not only how learning occurs but what is learned.
- Type D: introducing ICT as an integral component of the reforms that alter the organisation and structure of schooling itself. (Downes et al., 2001 p. 23)

Bowes said that participants were likely to be addressing all of these uses for ICT simultaneously in their professional work. Although the distinction between the types is useful, in reality schools are seeking to address all of these issues simultaneously. This provides a challenge in the design of pre-service and inservice learning. She restated from the report that if one wants outcomes in one of these areas, one must design professional learning that addresses specifically that type and not expect outcomes in the other types to flow naturally.

The fundamental intent of the PICTL study was to address Type C — using the new curriculum and pedagogical frameworks to stimulate professional learning in new ways.

For local projects the following questions became a useful way of both designing activities and reviewing what had happened:

- What are the purposes of the PICTL studies? Do they address only Type C or are they seeking to address multiple levels at once?
- Does "the one size fits all" work when universities independently design programs and schools have different needs?
- Do the PICTL project designs need to be different to cope with the diversity in ICT systems and their governing policies?
- How can moving from a "training model" help facilitate teachers designing learning? What is the role of the system in providing rich environments that are content-free, into which teachers put their own learning designs?
- In this four part key for uses of ICT in schools, how difficult is it to measure the learning outcomes for the stakeholders and the effect of teacher learning on systemic reform?

Bowes elaborated the dilemma that systems need to create seamlessly interconnected technical environments which match the needs of most teachers in schools, while also fostering innovation. This may sound simple, but in reality, it is a complex and challenging process to deliver a learning management system that meets the diverse needs of a range of teachers and students. The result is often multiple systems that inter-connect.

Sustainability is a complex challenge for systems. At school and teacher level people can be highly innovative and individually produce best practice and high level outcomes. For a system, scaling this standard to every teacher is very difficult, if at all possible.

Debbie Kember

Debbie Kember began by stating that discussion had been about innovation in local contexts and that the common ground has been about improving the integration of ICT into new curriculum and new pedagogy. PICTL is actually bigger than this. It should be about how our future profession is trained. There are many stakeholders represented here who need to be involved in this debate which ultimately affects programs that systems want to host and implement.

Kember suggested partnerships were important to overcome isolated decision-making. Many of our organisations operate within our own sphere, without the connections being made to other groups who may have a shared interest. Here we have come together under the banner of ICT to influence the generational change to the teaching profession. We need to continue this willingness to be partners in our jurisdictions. It is now time to advocate both partnerships and models for pre-service teacher learning with a Senate inquiry currently in operation.

She issued a cautionary tale about reports and reviews, mentioning that there had been 20 reviews by the time the landmark Ramsey Report was written. Since then there have been many more. However, she pointed out that there is currently much interest in this whole area and the newly established Teaching Australia, which is well funded and well positioned, is to be involved. She reminded the audience that this PICTL study could influence a broader agenda of change.

She gave an example of the Queensland Review of the Board of Teacher Registration which requires mandatory professional learning by teachers to maintain registration. One method of gaining this credit is to mentor pre-service teachers. The system is responding to this with support and recognition for participation by teachers. South Australia also has a professional development pathways process.

At a meeting recently with principals and universities, she was surprised by the lack of awareness by principals of the shortage of practicum places for pre-service teachers. This project provides an opportunity and a strategy to address broader aspects of teacher preparation and teacher professionalism.

Cathy Crook

Cathy Crook provided a school's perspective of sustainability. She commented that schools need to take ownership of the professional-learning agenda and, when they do, create safe environments for risk-taking.

Geoff Romeo

Geoff Romeo challenged participants to ponder some of the propositions that underpinned the forum. He deliberately provoked discussion and highlighted the complexity of universities operating in a larger context bound by seemingly shrinking resources and growing delivery expectations.

Romeo said the key question was: "Who is in charge of teacher education and in which direction are they being pulled?"

1. Do we want to do this?

   Who is we? We, the enthusiasts charged with the responsibilities of ICT, may want change, but the university inertia and the larger context of teacher preparation may work against change. universities will want to manage the process because there are other factors involved.

   Do pre-service teachers want to change?

   Do teachers and schools want to change?

   Is teacher education "broken"? Many here would say that within the constraints of the university, teacher education is actually effective.

   My university, which is the largest teacher preparation institution, has only four staff active in ICT in education. Is this duplicated everywhere and what are the consequences of such staffing?

2. Does it matter?

   Does ICT in education matter?

   Does professional experience matter?

   Does embedding ICT in teaching and learning matter?

   And if any of these things matter, to whom do they matter?

   Does it matter to much larger audiences other than the enthusiasts in the PICTL studies?

   Does it matter to the people who have power to make change in the institutions? How do we generate real commitment?

   Does it really matter to the range of people who can help us make the changes?

3. Change is possible. We can do this. We can make these changes. We can create these partnerships on a much larger scale.

   Can we create seamless professional development frameworks where pre-service teachers move from pre-service to in-service so we can thereby create an effective, competent, innovative workforce?

   If we are going to make change, the literature says we need to address leadership, and yet the groups haven't addressed the importance of leadership teams in schools.

   What has been the effect of all the reviews on actual university practice in teacher preparation?

4. Can we trust our research?

   Do we have enough evidence to proceed with confidence that the PICTL model is the right model?

   How do we cater for the research interests of universities? The current funding models value and reward research over mainstream practice. Universities are faced with the dilemma of wanting to put resources into teaching, but must sacrifice research dollars to do so.

Mackay, as facilitator, responded with an example from the earlier panel:

1. We now know more about site-based real-time learning. The forum is suggesting this is where powerful learning occurs. Pre-service teacher learning through classroom implementation is valued and valuable according to the pre-service teachers here at this forum.
2. We know there is a critical mass of students who we would describe as the "long tail of under-achievement". We all believe ICT is a tool to improve this.
3. Does it matter? There is documentation and evidence to show that the majority is saying it does matter. Nationally and at state and territory level, educational organisations are all saying it matters. Perhaps it is only within universities that there is a perception that it doesn't.

Gillian Dellitt challenged the notion that there may be people with the power to make change and people without the power. She asked, "Does it matter that it doesn't matter?" If you asked bank tellers in 1985 if they wanted to change the industry, none would have wanted to change. We know that change occurs from catalysts and people are really powerful in that change. Change is "coming, ready or not". The question is how can we act as powerful agents to shape this change in ways that we as educators believe will realise our dreams? We have now some of the tools in the use of ICT.

Mackay said there was dichotomy. Universities claim they are in control of teacher education. However, government policy and action influence what universities control and what they do. This project is evidence of a willingness and determination to overcome the inertia and resistance to change by universities, schools and their systems, and will be reflected in the recommendations of the report.

Romeo responded that the pessimism in the university sector concerns the proposition that it is time to reconceptualise teacher education. The constant reviews have continuously suggested change but without real policy and adequate resources to implement such. The challenge to universities is to muster the will; the challenge for government is to provide the resources.

References

Downes, T., Fluck, A., Gibbons, P., Leonard, R., Matthews, C., Oliver, R., Vickers, M. & Williams, M. (2001). *Making better connections: Models of teacher professional development for the integration of information and communications technology into classroom practice*. Canberra: Commonwealth Department of Education, Science and Training.

MCEETYA, Ministerial Council on Education, Employment, Training and Youth Affairs. (2000). *Learning in an online world: the school education action plan for the information economy*. Adelaide: Education Network Australia.

MCEETYA, Ministerial Council on Education, Employment, Training and Youth Affairs. (2005). *Pedagogy strategy: Learning in an online world*. Melbourne: Curriculum Corporation.

Ramsey, G. (2000). *Quality matters: Revitalising teaching: Critical times, critical choices; Report of the review of teacher education*. Sydney: NSW Department of Education and Training.

Wellman, B. (2001). Computer networks as social networks. *Science*, vol. 293, pp. 2031–2034.

Williams, M. (2004). *AGQTP Report*. Brisbane: Education Queensland.

Appendix

Program

Partnerships in ICT Learning Forum 2006: Sustaining Partnerships in ICT Learning, 26 and 27 April 2006, National Museum of Australia.

Day 1

Wednesday 26 April	Facilitator: Tony Mackay			
12.45–1.15 pm Peninsula Room	Registration			
1.15–1.30 pm Peninsula Room	Welcome and introduction Gary Powell, Manager, Performance and Targeted Programmes Branch (DEST)			
1.30–2.00 pm Peninsula Room	Background to the PICTL Initiative / Purpose of the forum Ralph Leonard			
2.00–3.30 pm	State and territory project presentations			
	Peninsula 1 ACT NSW	Peninsula 2 VIC SA	Bunyip Room QLD WA	Biami Room TAS NT
3.30–4.00 pm	Afternoon tea			
4.00–4.45 pm Peninsula Room	Plenary — Participants perspectives on projects, local/national issues raised			
4.45–6.00 pm Peninsula Room	Emerging issues			

Day 2

Thursday 27 April	Facilitator: Tony Mackay
9.00–9.10 am	Recap Day 1 — emerging issues Tony Mackay
9.10–10.00 am	What is the data telling us so far? Michelle Williams
10.00–11.00 am	Panel discussion: From the projects — a personal perspective Kylie Butler, Lisa Jones, Colin Baskin, Michael Carstens, Michelle Blakely, Bruce White
11.00–11.30 am	Morning tea
11.30 am–12.45 pm	Roundtable discussions — focus questions
12.45–1.30 pm	Lunch
1.30–2.15 pm	Expert panel: Testing propositions emerging from the forum. Janine Bowes, Debbie Kember, Geoff Romeo, Cathy Crook
2.15–3.00 pm	Where to from here? What are the key issues that have emerged: – that will support sustainability? – that work against sustainability?
3.00 pm	Conclusion of the forum

Conclusion

As part of the PICTL study, an informative mix of professional learning models was trialled by the state and territory projects. These models were all variations of the PICTL framework for professional learning. They were implemented with varying levels of success, but in all cases participants engaged in professional learning and contributed to a rich collection of data to inform future planning for collaborative partnerships that support ICT learning. Full analysis of the reports from these projects and the report from the National PICTL Forum appears in *Partnerships in ICT Learning: Full report*.

Following is a synthesis of the findings identified in the state and territory project report executive summaries and by the forum participants. These findings overlap with, but do not necessarily parallel, the findings outlined in *Partnerships in ICT Learning: Full report*, which are arranged so as to address the PICTL study research questions. The findings in this conclusion give a perspective that comes directly from the participants themselves. These findings are discussed in six areas: project management, partnerships, pre-service teacher education, schools, professional learning and sustainability.

Project management

A key message to project managers is to expect the unexpected and to be flexible enough to absorb the impact of the unexpected. This often begins with the pressure imposed by late starts of projects due to contract or funding issues, and continues as the full impact of the evolving education environment unfolds.

Not all projects implemented in classrooms eventuate as planned.

There are many aspects of teacher and school community life that impact on how a project progresses. These are unknown at the outset of the project and so any project needs to have enough flexibility built into the design to allow teachers and schools to make adjustments to suit the ever-changing school environment.

Not all project outcomes are planned.

While there is an expectation that planned outcomes will be achieved, projects often result in unplanned outcomes. These should be well-documented and become an important part of the reporting process. All outcomes, planned or unplanned, are considered as valuable, with success being measured at both the individual and partnership level. Most states and territories viewed their outcomes as contributing to much broader professional learning and research agenda beyond the scope of the PICTL project.

Policies can be enablers or blockers.

As professional learning and research projects are an integral part of our education system, they are directly impacted upon by a myriad of policies and procedures. Whether based in universities or school systems, these policies and procedures have an interesting part to play in project management. On the one hand they may be linked to agreements that can facilitate the processes necessary to support a project, but on the other hand they may be so cumbersome and time-consuming that they block the progress. While the enablers are appreciated and eagerly sought after, the blockers need to be addressed. This will only be achieved through the cooperation of authorities at all levels of the education system.

Partnerships

The PICTL study involved partnerships at both the institution level and the personal level. These partnerships were an integral part of the implementation of the professional-learning framework based around ICT learning. The partnerships were valued by all participants and provided a rich source of possible formats for partnerships in the future. Partnerships between universities and schools, as well as partnerships between educators, can be enhanced through projects like these.

Cultural differences exist between universities and departments of school education

What is valued and what is fore-fronted differ significantly between departments of school education and universities, despite a common ultimate goal to improve student learning outcomes. These differences are further exacerbated by the technical discrepancies between network connections when it comes to using ICT. Universities and schools need flexible and responsive ICT infrastructure that can respond to the rapidly-changing internet landscape and provide space to allow innovation. The projects are thwarted because of lack of permissions for networks and people to "talk to each other".

Community building is critical to professional learning

Collaboration is a critical factor for professional learning in ICT learning, but the nature of the collaboration and how it is facilitated can vary. A learning community model was shown to nurture collaborative relationships between the teachers, pre-service teachers and lecturers and provided mutual support for professional learning. As communities of common interest grow, teachers can connect to the energy, becoming part of one interconnected learning system. The partnership model is strengthened when action-learning and action-research paradigms are used, but for some projects this was more successful for the teachers and pre-service teachers than for the academics. Such communities of practice need to rally around the school sector to create the impetus and context for embedding ICT in learning.

Pre-service education

Collaborative knowledge constructed by state and territory projects impacted on the design of ICT learning programs in universities as well as in schools. In particular, undergraduate programs and pre-service teacher links with schools are being redefined.

Rethinking pre-service teacher courses can better support ICT learning

ICT needs to be integrated more extensively into all aspects of pre-service teacher courses. This needs to include an emphasis on pedagogical approaches to using ICT, as well as operational skills. These should be introduced early and revisited often, to prepare pre-service teachers for teaching in ICT-connected schools. An annual audit of the ICT-related aspects across a course could assist universities to evaluate the depth and breadth of their preparation of future teachers. Existing courses should be redesigned, or new courses developed to support pre-service teachers in experiencing the latest technologies, especially those that foster collaboration. This rethinking should include the embedding of ICT competencies into assessment criteria for professional experiences as well as for coursework.

Pre-service teachers are enthusiastic but hampered by existing commitments

Pre-service teachers were very enthusiastic about opportunities to be involved with professional learning in collaboration with teachers and lecturers, especially with the specific focus of in-school action learning. Such opportunities should be further developed within pre-service teacher education. However, actual recruitment of pre-service teachers was difficult because they already have heavy personal and study commitments and involvement in a project is viewed as a work overload. Unfortunately this is exacerbated by the pre-service teachers' perceptions that experience and expertise

in facilitating ICT use by students is a non-necessary component of teaching and accreditation. An important feature of sustaining pre-service teacher enthusiasm was providing opportunities for them to work together on projects. They supported each other to make the development process easier and were still able to maintain a suitable level of engagement with the teacher.

Traditional practicum may not be the best form of professional experience for project-based professional learning

There was agreement that professional experiences that allow pre-service teachers to undertake experimentation and innovation with ICT in schools are valuable. However, practicum may not be the best place for this to occur, and there is a need to rethink the role of the practicum as the key interface between schools, universities and pre-service teachers. Because innovation decisions are made through a cost-benefit analysis, and uncertainty is often a major obstacle, an instability exists that can undermine the critical assessment nature of a practicum situation. In fact, with work on new ICT applications there are advantages in reversing the typical partnership arrangement of a "standard" practicum, thus allowing pre-service teachers to lead the innovation with the teachers in a supportive role.

Schools

The technological systems and models of pedagogy that school systems choose to promote will ultimately determine the future of ICT in education. For informed decisions to be made action research needs to be encouraged in schools.

Supportive environments promote risk taking

The environments that are provided schools for experimentation with ICT need to be easy for beginners to use and allow for focus on pedagogy rather the technology. Students are quick to harness the power of ICT if it is put "in the hands" of the learners. Environments that allowed for student interaction were positively regarded by all who were involved. Having pre-service teachers work with teachers as new technical skills are introduced assisted in creating a supportive environment.

Resourcing barriers continue to challenge implementation of ICT in learning

Barriers to the integration of ICT into learning are always a challenge for pre-service teachers to overcome when they are expected to implement ICT in classrooms. These barriers can exist in attitudes as well as infrastructure. Generally, attitudinal barriers could be overcome but infrastructure problems were more of a challenge. While teachers are generally able to recognise the pedagogical potential of ICT, they are limited in the time they can spend with the technologies. This lack of time for investigation, reflection and planning continues to be a major constraint on teacher involvement in action-research projects. Strategies that alleviate the impact of these barriers include focusing on specific learning strategies, involving a substantial group of teachers from one school in professional conversations, and fostering collaboration on developments of value for future use.

Pre-service teachers have a critical impact on the uptake of ICT in schools

Many of the state and territory projects found that pre-service teachers were a catalyst for change, bringing the "critical mass" for innovation in participating schools. The resulting school and community renewal was built on informed evidence-based research in the PICTL study. The appearance of pre-service teachers in the school helps to alleviate teacher perception that the ever improving technological functionality is merely "yet another add on", helping them to recognise that it is integral to a teacher's "thinking" and actions.

Professional learning

It is becoming increasingly important to improve the nature and uptake of ICT-related professional learning opportunities.

Professional learning needs to be practice-based

Supporting in-school projects that allow action research based on classroom activity gives all participants the opportunity for professional learning in context. It has the added bonus of providing teachers and students in schools with a wider audience for sharing their learning.

A sense of ownership is critical to professional learning journeys

Embarking on a learning journey designed to expand knowledge, understanding and consequent skills in ICT in education is a big step for teachers and pre-service teachers. For experiences to be effective they need to have a say in selecting the ways in which this will occur, and thus form ownership of their learning. Allowing participants to select the focus of their action research provides the incentive to engage in development work, as well as the opportunity to challenge their views on learning.

Deeper learning and motivation is generated by holistic approach and reflection

The quality of the learning generated by the various professional learning models was notable. Providing opportunities for teachers and pre-services teachers to reflect on their practice facilitated a deeper understanding of the complexity and possibilities of ICT. An holistic approach to ICT learning, emphasised the human aspects of working with ICT, and the empowerment teachers and pre-service teachers as individuals and also as members of a partnership. This was fundamental to the deeper learning and on-going motivation of teachers to continue to explore and develop the ICT domains of teaching and learning.

Sustainability

Despite the good intentions of the PICTL study, sustainability remains a big issue for all states and territories. There is a need for further investigation into associated scaffolding which would allow provision of professional learning partnership opportunities with the same level of depth as achieved in the PICTL study but over a longer timeframe and for larger groups.

Time is needed to move froward from a trialling phase

Time (or lack of it) was a constant factor on many levels, in the challenges identified by the states and territories. Especially important was the unsuitability of short timeframe projects to produce truly sustainable professional learning partnerships. Although many participants saw their project work continuing beyond the life of the PICTL study, there are many resourcing issues (including time) that would need to be addressed for most of the models to be sustained. One incentive to continue this work has been provided by the developing awareness that pedagogically there is a place for innovative ICT in learning.

All indications are that despite the challenges, the participants in the professional-learning community that was nurtured to support the various state and territory projects, found involvement in the PICTL study to be worthwhile. A large variety of partnerships was formed and all had enlightening stories to tell. These stories were shared in the reports and at the forum. Any future formations of professional-learning partnerships will benefit from the advice that has been shared by those involved in the PICTL study and will be assisted as they strive to further strengthen the connection between ICT and learning.

Partnerships in ICT Learning Study: **Case studies**