Integrating IT: Look, no Wires!

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Abstract Over the past decade the push for student teachers to develop competencies in using information and communication technologies (ICTs) in teaching and learning has increased. This paper examines the implementation of the Mobile Teaching Facility (MTF) project (wireless notebook computers in trolleys) in the Faculty of Education at Deakin University. The use of these resources has enabled us to be more responsive to the needs of staff and students to effectively incorporate technology into teaching and learning in ways that are contextualised and authentic. The implementation of the MTFs has supported the professional development of staff and students and led to exciting possibilities in using technology to support practice. Not all staff and students are keen to adopt technology that often leads to new thinking about pedagogy and methods to overcome this issue are discussed.

Our experience shows that the integration of ICTs into the classroom with a focus on teaching and learning rather then computers themselves, helps support users other than early adopters to participate in the project using these tools.

Introduction

In response to the need to integrate information and communication technologies (ICTs) into teaching and learning, and implement Faculty and University strategic priorities for both staff and students, the Faculty of Education at Deakin University undertook a project which developed sets of Mobile Teaching Facilities (MTFs). These consist of notebook computers (in a trolley) that use wireless networking to access the university intranet and the Internet. The Faculty received university major equipment funding in 2001 and 2002 to set up four sets of 10 notebooks. There are three trolleys with Acer notebooks and one with Apple iBooks and they also feature access to scanners, USB digital cameras, video cameras, video projectors and spare batteries. The trolleys house the equipment including network base station (access point) and need to be connected to a power supply and network point in a tutorial room.

The purpose of the MTFs is to create a class-based flexible environment that enables academic staff to model the use of information and communication technologies (ICTs) in pedagogies that are integrated into the curriculum. This project has been innovative in that it is the first implementation in the university to take advantage of wireless networking for teaching. The MTF provides a teaching and learning environment that removes the constraints of regular computing laboratories and allows for innovative pedagogy in a variety of contexts. Low take-up by academics of Education Studies Online (ESO), an integrated online environment designed to support the undergraduate Education Studies Major, has been somewhat overcome with the introduction of the MTFs.

Academic staff and students were asked for reflective evaluations on the ways the use of the MTF affected their teaching and learning and supported their professional development and competencies in using ICTs. Their responses indicate that the project has been able to

stimulate thinking about the learning process and develop some changes in pedagogic practice. More formal questionnaires to be completed during 2003 will further inform the effectiveness of the project in helping to improve teaching and learning and the success of integrating ICTs.

ICTs and Teaching Online

One of the ICT platforms that the Faculty has developed to enable the authentic integration of ICT with teaching practice is ESO. This initiative is aimed at supporting the Education Studies Major in the Faculty of Education. The ESO website is an online environment that has a range of highly integrated and interactive features. These include context sensitive navigation, searching, comment and discussion areas, private journal, private portfolio, public website, multiple media resource repository, guided learning areas, activity areas with integrated resources, and various forms of feedback.

Students benefit from the experience of working in the ESO environment through their exposure to online technologies that are likely to assist them as they begin their work as teachers. Education Studies Online also provides significant opportunities for lecturers to develop their pedagogy in a way that incorporates a level of online interactivity that has an impact on the curriculum.

> "The existence of the ESO as a unified, flexible, interactive learning environment, precipitates new approaches to teaching by staff and students. Naturally, it also places pressure on staff to re-engineer their curriculum, because the subject of study (teaching and learning) in the Education Studies Major is placed in the spotlight through the cultural tools and practices enabled by ESO." (Segrave and Warren, 2000)

Research (Warren, 2001) shows that there are issues with the adoption of ICTs as many academic staff are not using the technology in their teaching. Change occurs slowly and this is in spite of university policy and strategic planning.

> "While there seems to be recognition that there is policy and vision at university level, faculties and schools have not yet fully embraced these nor understand their implications for academic work." (Warren, 2001 p.34)

Most academic staff are using computers in their professional practice to write, use email and search the web but apart from that, there is a relatively small group of staff who use the technology for 'advanced technology applications' that are expected of students when they enter the workforce. Many teachers (and lecturers) tend to teach as they have been taught and therefore the use of computers needs to be introduced into teacher education courses early and the use of learning technologies needs to be modelled throughout (Maddaux, Johnson and Harlow, 1994; Hunter, Fryatt and Brown, 1996). I see that the challenge is to provide attractive, interesting and meaningful opportunities for academic staff to integrate the use of information and communications technology into their teaching. We are past the stage where we question whether the new learning technologies are an improvement over traditional methods to questions about how to convert them into effective practice (Laurillard 1993). We need to adapt/change with the times and now need to include the particular tools provided through the advances in ICTs in our work.

Some staff argue in opposition to teaching and learning online and the use of ICTs, by suggesting that you do not have the same opportunities that you have when teaching face-to-face. I propose that the MTF makes it possible to develop and access online learning situations that complement face-to-face environments. Johnson and Warren (2002) suggest that the two domains of Online and Face-To-Face can overlap in the teaching and learning process and that the use of digital resources and ICTs supplement this. The MTF used in conjunction with ESO makes it possible to use digital resources such as text, images, audio and video. These can now be used in a face to face setting and complement the use of resources developed using traditional technologies such as black/white board, hand-outs on paper, the audio cassette and VHS tape. Traditional and digital resources deliver the same content but the digital versions are able to be manipulated in multiple ways and be accessed anywhere at any time. It is important that these new skills of digital resource manipulation are learned as they are the new tools of culture becoming necessary to communicate with the world.

Implementing the Mobile Teaching Facility — Why No Wires?

Through discussions with academic staff it was evident that there was a reluctance to go to a computer laboratory that is regimented in rows and with computers in fixed positions. This type of environment does not encourage discussion and collaboration but can be effective in particular teaching skills and activities. This encourages learning *about* ICTs rather than learning *with* them or *through* them. Thinking about the advantages of the portability of notebook computers and 'wireless technology' to support learning with and through ICTs and the benefit of taking the computers to tutorial rooms, led us to the idea of a Mobile Teaching Facility. We chose the name because it was supposed to be a teaching tool and did not refer to technology, laboratories or computers. Combined with the constructivist pedagogical principles designed into ESO, the MTF and its wireless networking technology provide a platform that can empower teachers and students to develop new practices.

> "Such learning practices incorporate higher order skills like problem-solving, reasoning and reflection. The creation of a mobile learning environment through wireless computing also has implications for…educational contexts such as law schools, teacher training universities, nursing schools, and medical institutions." (Sotillo 2003)

Before the staff were able to use the MTF they were expected to attend a 'getting to know you' workshop session where they were introduced to the MTF and participated in 'class'. They experienced things such as taking a machine from the trolley, attaching the digital camera, taking pictures, saving files to their home directories and trying some software. There was some excitement as participants realised they were not connected to the network or power supply, they were wire-less! A range of software is provided on each laptop that either supported particular key learning areas or is generic type software that could be used for teaching and learning including; Microsoft Office, Reason!Able and Inspiration. Site licenses for resource CDs such as *Investigating Assessment Strategies in Mathematics Classrooms* and *Investigating Teaching Strategies in Mathematics Classrooms* were purchased and these were installed directly to hard disks to save CD inserting and battery drain. Easy access links to information technology services such as Home Directories, Web Mail, the university intranet, FirstClass conferencing and the Internet Usage System were designed into the desktop. Digital cameras were also available which plugged directly into the laptops so students could

take pictures of their work or they can be used for video conferencing. A data projector was made available with the trolley so that the lecturer or students could make presentations to the whole class.

The MTF machines were configured to authenticate users to access the university network and bandwidth issues have been negligible even when viewing streamed video during classes. The flexibility of accessing and using digital resources has made it possible to create a range of learning activities. In addition the use of ICTs allow academics to be more responsive to contemporary developments that might be of interest in the context of what is being studied. As well as this, the use of off air recording of TV and radio broadcasts which are digitised and delivered (with copyright clearance) via the intranet means that topical issues can be discussed both by on and off campus students. For instance, rather than having to watch a whole 75 minute video online, academic staff have been able to provide links directly to sections of video for the purpose of guiding students to work on specific tasks and activities. The use of QuickTime streaming and reference movies has encourage academics to think differently about what type of activities and tasks they set for students. Support in developing these different versions was provided by staff in the faculty and the Learning Service Division. As the faculty is a predominately Apple computer user we are now finding that some academics are keen to edit their own video using iMovie and video cameras connected via FireWire.

The MTF is a tool for teaching and learning not just a set of computers. Many existing teaching models fail to authentically integrate ICTs because they separate technology from application and integration into teaching practice (Beacham and Kester, 1994). The project has gone a long way towards integrating ICT into teaching and learning in ways that are not possible in general-purpose computing laboratories and has brought about change in staff understanding of ICTs. The idea of ubiquitous computing that allows the focus to be on the learning rather than the technology allows users to concentrate on the learning process instead of the technology. We have found that ESO and the MTF together are able to support the six conceptual frameworks that Campbell (1999) suggests need to be considered for online technology based learning:

- Multiple representations of reality,
- Authentic tasks,
- Real-world, case-based contexts,
- Fostering reflective practice,
- Knowledge construction,
- Collaborative learning

To this end the use of the MTF in the faculty has been focused on addressing aspects of the Australian Council for Computer Education (2000) policy on the use of ICT in preservice and inservice teacher education, issues arising from previous staff research into the integration of ICT in preservice teacher education (e.g., Nicholson, 1998), and from other recent literature (e.g., Russell et. al, 2000). In particular, there has been a focus on providing students with focused, situated experiences in using ICT in their primary technology education program, addressing the following:

- Teacher education courses should be seen as an opportunity to identify and develop learning technology competencies.

- That the development of confidence in adapting to new ideas and technology is as important as the development of the competencies themselves.
- That the development of the knowledge and skills required for teaching with and through technology should be developed through authentic learning experiences.
- That ICT should be a 'seamless' part of the classroom environment in which its use is as an integral part of pedagogical processes.

Marino (2001) suggests that five factors (resources, money, time, student evaluations, and support from colleagues) need to be taken into account before implementing new technologies. The relative success of the MTF project is due in part to the support at university level through funding for the hardware and software resources, staff preparation time and willingness to be involved, and peer support between staff and students who have found exposure to the MTF a worthwhile experience.

Competency and Professional Development

The MTF has made a relevant contribution to increasing competencies in ICTs and has provided significant staff professional development (PD) opportunities as academic staff can now see just what is possible in a classroom using ICTs. Through using an 'in-house' resource, staff also feel more comfortable acknowledging lack of expertise in particular areas and are more willing to use an accessible, purpose configured facility rather than go to a 'computing lab'. This PD also supports the university Teaching and Learning Management Plan (TLMP) (Deakin University, 2000a) objective of enhancing staff capability.

Student generic skills are also being enhanced through their use of the MTF and the competencies gained satisfy the requirements of the Standards Council for the Teaching Profession (1999) beginning teacher competencies. The MTF allows the Faculty to integrate a range of technologies into its teaching to ensure that our students are provided with opportunities to use, examine and discuss exemplars that they in turn will be expected to offer their students as professional educators. The Faculty is now more able to match the development in the level of equipment and use of ICTs in schools and is able to provide in situ demonstrations and model innovative forms of pedagogy using information technology in a variety of classroom settings. One academic put it this way.

> "The aim was to identify the knowledge and qualities which will prepare students for new opportunities in the educational sector and to create links between teacher professional development using ICT in our units and current classroom practices in schools, where the practice of computer aided teaching and learning in general classrooms is integral to learning at all levels of schooling. During the semester, we actively worked in both units to create an environment for on going participatory professional development for both students and lecturers, focussing on the development of technological based expertise and strategies, supported by collaborative and cooperative modes of teaching and learning." (Graham)

The MTF is aimed at improving our capacity to ensure that our graduates have the follwing attributes:

- The ability to identify, gather, retrieve and operate on textual, graphical and numerical information (appropriate to the discipline area of teacher education);
- Personal skills in information technological literacy.

This supports the *Deakin Advantage: GenericAttributes* (Deakin University, 2000b) in a numbers of ways, particularly in the area of discipline-specific attributes and generic attributes personal-skills. The MTF also builds on the outcomes of core objectives of the university First Year Initiative Policy by *enhancing student integration into the University's learning environment* and supporting the *enrichment of academic skills development* in the area of ICTs. Building on the initial orientation experience by incorporating the use of ICT to access the library and systems such as FirstClass provides a continuum and linkages for new students as well as disciplinary skills within the context of teaching and learning.

One of the possibilities of the MTF being used as professional development (PD) vehicle are highlighted by Brian as he explains how he used it.

> "Earlier this year I was asked to demonstrate features of Education Studies Online to staff involved in planning and teaching in the first year Education Studies course in 2002. I was about to use a data-show and demonstrate the site to the staff when I thought the Mobile Teaching Facility could make this into a professional development opportunity. I wheeled the MTF into the meeting room, gave each staff member a computer and led them through logging onto the site and then exploring its various features. What could have been a 'show and tell' was a 'get involved and explore — hands-on' activity." (Brian)

So, Then What Happened? —Feedback

Feedback from MTF users was generally positive and indicated the level to which people had been willing to try something new. Most academics were familiar with the rhetoric behind the push for increased competency in using ICT. In was evident that the integrated use of ICT in teaching represented the giving up of some (traditional) control of the learning process. One interviewee suggested:

> "Everybody's threatened by the fact that, I'm a seriously good academic I don't want to be incompetent and as soon as you throw in a whole area, another knowledge base of teaching they don't have, they're all threatened enormously." (Peter)

Some staff were prepared to give the MTF a try but wanted to maintain a tight control on what was happening, particularly how (and what) learning might occur. This indicated a willingness to be involved but showed that there might still be a way to go before there was a true understanding of the type of learning that is possible using the MTFs.

As teaching staff incorporated the MTF into their classrooms it became possible to shift responsibility for learning to the student by providing them with the tool (Taylor, 1980 and Jonassen, 2000) to learn with. The wireless laptop technology has allowed the tutorial to become a student-centered classroom in which students also gain confidence and feel empowered with computing skills that benefit them beyond a particular class. One academic response was;

> "The use of the MTF allowed staff to integrate the use of ICT in ways that would not have been possible in a 'normal laboratory' situation, allowing flexibility in grouping and intra-group roles, collaboration in and between student groups, and

> provided a valuable means of documenting the students' technology design and development process — something that previously required hand-drawn sketches and copious notes. What was different was that they were using it as a learning tool, rather than as a word processor." (Gillian)

The capacity for the technologies available in the MTFs to provide portfolio type resources for students was apparent in a particular technology class students using the MTF were encouraged to;

- Access the global network as a resource and communication tool.
- Create teaching and learning resources using software such as Microsoft Office, Power Point, web authoring tools such as Composer and content organisers such as Inspiration. (These are located in the Student Portfolio section of web site)
- Use FirstClass for class communication and interaction
- Develop a Professional Learning Portfolio using FirstClass and:
  - Include individual responses to unit texts
  - Interact between students regarding texts
  - Post student led tutorial activities
  - Peer tutoring tool
  - Repository for student power point presentations and web sites both in-progress and completed.
  - A shared resource for peers and other students with access to unit folders (across campus and distance education students).
- Record their engagement in practical workshops and complete projects using the notebook's digital cameras.
- Locate and use exemplary web resources as an information resource and for curriculum development.

An encouraging response that indicates that academics have engaged with the possibilities of new ways of learning is highlighted in the following.

> "We have already discussed ways to use the MTF next year in Mathematics Education for making contact with, assessing particular aspects of their knowledge and providing appropriate learning activities for individual children. This will give valuable work experience without the need for funded practicum days as well as excellent individualised data for assignment work. The availability of the MTF has made such discussions possible, so is stretching the staff's imagination about what is possible with computer mediated instruction." (Janice)

Just how well the MTF has been able to be incorporated into the tutorial class is indicated by the follow response.

> "A seamless integration within the physical setting of the session, between different modes of teaching and learning, complements current practices in many schools and provides students with experiences in structuring learning using different modes of presentation and in the organisation of computer learning experiences such as:

- Immediacy, promotes the extensive use of ICT as a teaching and learning tool within the framework of an on going classroom presentation or workshop,
- Exemplars, provide examples of art forms, and curriculum resources relevant to tutorial/lecture/workshop and,
- Supports the concept of a global classroom of learners. ” (Mary)

Other responses from academics confirm this. One academic listed a range of activities she is able to do through the use of the Mobile Teaching Facility and then went on to say that

> “It is important to note that these activities were conducted in a science laboratory room where the use of desktop computers is not feasible due to the lack of provision of power and network points, allowing the students to fully integrate the MTF computers into their workspace and learning activities. In particular, it allowed students to model the kinds of classroom environments that they would be expected to be able to create and manage in their teaching.” (Fiona)

When asked about the response of students to the use of the MTF an academic responded by saying.

> “It was interesting to observe that at first, students were treating the wireless laptop computers as if they were desktop computers — they would for example call a colleague over to show them something from a website. They gradually got used to the mobility of the tool and would carry the computer, as if it were a book and share what they had found with someone in a different location. A significant number of students have said, ‘this is how I would like to use computers in my classroom when I am a teacher’.” (Alan)

Other student responses highlighted their appreciation that the ‘vibe of the tutorial’ was maintained using the MTF in the same room rather than go to a computer lab. Another student announced that she was ‘no longer afraid of laptop computers’ as they were easy to use and peer support was readily available. As there are over 37,000 (2002) laptops out in Victorian schools (as part of the Notebook Program for Teachers) it is even more important that we provide students with the confidence to use these tools in their practice.

Conclusion

The Mobile Teaching Facility is not the complete answer to all our problems with regard to using computer based technologies in our teaching but it has made a significant difference to some academics in enabling the accessibility of the technology in the tutorial room environment. Issues and problems encountered as we adjust to using this facility in our tutorial rooms so far include the bandwidth of the wireless connections and some difficulty in manoeuvring the trolleys around the buildings and through doorways. We have designed a smaller model trolley with more efficient wheels that are easier to move around. A resource such as the MTF cannot guarantee the development of authentic learning experiences. However the facility can be integrated into pedagogy to enable this to happen. While the MTF may solve the problem of effective integration of ICT into the classroom and provide opportunities for teaching and learning, much needs to be done on the part of the teacher to ensure success. The feedback received does indicate staff are aware of the potential of the

MTF in achieving strategic learning outcomes, we are still looking at ways to respond to pedagogical needs and opportunities and encourage involvement from other members of the faculty.

Current faculty projects in the process of development that involve the use of the MTFs include a set of initiatives based around opportunities to internationalise the curriculum, and give students access to observe classrooms from university settings. Students from four different countries will be invited to participate in fully moderated, curriculum based online discussions, while being able to express themselves in their native language and have available parallel translations to and from English. These discussions will be moderated by a cohort of teacher education postgraduate students as part of their curriculum. Portfolios, journals and electronic assignment submission are also aspects that are supported through the use of the MTF. The MTF makes these projects contextualised, authentic learning environments for teacher education students. For staff it is project based professional development that encourages participation and integrates ICTs in their pedagogy.

Future enhancements will include some video kits (to be called ViKi's) that will have a 12" G4 PowerBooks matched with a digital video camera in a flight-case that will be able to be borrowed by staff and students for making video projects using iMovie. These kits will also support our 'EyeCT' project which will enable teacher education students at Deakin University to observe a 'live' lesson being taught in selected classrooms (primary and secondary). Schools will be lent a ViKi to broadcast (QuickTime Broadcaster) back to Deakin to enable teacher education students to observe live classroom action. Teacher education students will have focussed observational tasks and at the end of the lesson they will have the opportunity to discuss the focus questions with the classroom teacher via a broadcast back to the school.

Adequate support structures through faculty leadership, technical support in the faculty and university support through the Information Technology Services Division have helped the MTF be the success it is. The development of a range of digital resources such as video, audio, graphics, text and multi media presentations help teachers and students understand some of the possibilities available through ICTs. Models and exemplars of good teaching and learning practice using ICT are also being developed to help teachers understand potential opportunities (eg, students designing their own assessment tasks and developing resources as case studies for assessment and presentation to their peers). The MTF is not a solution looking for a problem but it does provide a gateway to a range of possibilities that may enhance pedagogy and enable teachers to explore new terrain in learning and teaching. The MTF can provide an interface between traditional and new ways of teaching and learning as well as providing access to professional development in ways that are meaningful, worthwhile and non-threatening. Time will tell just how effective tools like the MTF are in creating and sustaining meaningful change in the way we teach and learn.

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