

We Want to be Teachers, Not Programmers: In Pursuit of Relevance and Authenticity for Initial Teacher Education Students Studying an Information Technology Subject at an Australian University

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Abstract

Information Superhighway is a technical subject on Internet technologies and web authoring whose content is geared primarily towards undergraduate students majoring in information technology, but is undertaken by Bachelor of Education and Bachelor of Teaching students at Charles Sturt University, a regional university based in New South Wales, Australia. The lecturer is tasked with the challenge of targeting the specific needs and interests of these students, while not adversely affecting the other students in the cohort. This article describes how a project-based learning approach, together with the involvement of a local high school, was used to promote relevance and authenticity for the teachers-in-training. Findings from an end-of-semester survey suggest that the approach was effective in motivating the students as well as encouraging them to learn about ICT and integrate it into their future professional practice.

INTRODUCTION, BACKGROUND, AND CONTEXT

Contemporary teacher education curricula include coverage of information and communication technologies (ICT). The current approach to teaching ICT favored by many schools of education appears to be an integrated one in which ICT skills are taught holistically with pedagogical content knowledge and skills, so that students gain not only technical competence in using ICT tools, but also learn how to devise strategies incorporating the technology to enhance the educational outcomes for their students. However, organizational constraints related to economies of scale and the availability of ICT expertise amongst education faculty might dictate that some or all of these components are delivered as separate subjects.

Charles Sturt University (CSU) is a multi-campus, regional university in New South Wales, Australia. The School of Education at CSU's Wagga Wagga campus offers the Bachelor of Education (B.Ed) and Bachelor of Teaching (B.Teach) degree courses for students who wish to train to become qualified primary and secondary school teachers. Students in these courses undertake a number of core and elective subjects that are offered by other Schools and Faculties of the University, through inter-school service teaching arrangements. One such subject is ITC125 Information Superhighway, which is taught on-campus at CSU-Wagga Wagga by academic staff from the School of Information Studies but developed and convened by an academic at the School of Environmental and Information Sciences at the university's Thurgoona campus in Albury.

ITC125 is a particularly challenging subject to deliver to the teacher education students since it is intended mainly for students working towards undergraduate degrees in Information Technology. The instructor must customize the teaching, learning, and assessment strategies, developed by a colleague from a different school and campus, to suit the needs of the teacher education students. This article describes how the instructor

(a Lecturer in Information Technology who holds a Masters degree in Education) and teacher education students adopted a project-based learning approach and worked in conjunction with a local high school to promote relevance and authenticity. The goal was to assist the students in learning both about the technology as well as how they could leverage it in their future professional practice.

ICT IN THE TEACHER EDUCATION CURRICULUM: INTEGRATED OR SEPARATE?

There is certainly no shortage of evidence attesting to the importance of ICT in the initial/pre-service teacher education curriculum. Indeed, in the words of Lockard and Abrams (2003), ICT is “an essential part of the ‘basics’ of education in the twenty-first century” (p. 2). There is also general consensus amongst teacher education faculty that there is a need to equip pre-service teachers with not only the technology skills, but also the knowledge and skills needed to integrate the technology into the classroom (Moursund & Bielefeldt, 1999; Price & Herrera, 2002; Graham, Culatta, Pratt, & West, 2004). Otherwise, the result would be curricula that “teach people how to use specific types of technology, not how to solve educational problems using technology when needed and appropriate” (Kearsley, 1998, p. 50).

Most of the literature advocates the “infusion” of technology into the teacher education curriculum at all levels rather than simply adding ICT to the existing curriculum (e.g., Robertson, 1996; Willis, 1997; Gillingham & Topper, 1999; Dawson & Norris, 2000; Thomas & Cooper, 2000; Brush et al., 2001; Rademacher, Tyler-Wood, Doclar, & Pemberton, 2001; Morrow, Barnhart, & Rooyackers, 2002; Wentworth, Waddoups, & Earle, 2004; Bird & Rosaen, 2005). This has also been referred to as the “permeation” model, which “... involves the integration of educational computing as a methodology in curriculum areas through provision of computer based tutorials in appropriate subject units within the degree course” (Nanlohy, 1997, p. 177). However, this model is not always possible to implement, especially at smaller universities or colleges where it is simply not feasible to deliver these components as a single unit. At such institutions, there are substantial cost savings to be made by combining cohorts of teacher education students with those from other disciplines in an introductory-level ICT class. In addition, teacher education faculty are likely to have limited ICT expertise as technology was not a part of their own teacher education preparation (Norton & Sprague, 2002-2003); this is further compounded by the fact that ICT skill requirements for teachers have risen and are continuing to rise beyond simple computer literacy and the use of standard office applications. Internet technologies (now incorporating “Web 2.0” technologies such as wikis, blogs, RSS, podcasting), virtual reality applications and/or videogames and mobile devices are some of the many technologies that the so-called “Digital Natives” (Prensky, 2001a; 2001b) in today’s K-12 classrooms use everyday for communication and entertainment, and are purported to expect to use in their learning. This warrants the involvement of other schools or departments within the university specializing in educational technology or information technology. The teaching of ICT may be done in collaboration with, or in some cases entirely outsourced to, these schools or departments. Sprague (2004) calls for increased collaboration between teacher educators and educational technologists to work towards building greater levels of

technology and technology integration expertise amongst the former group, and promoting a stronger understanding of pedagogical issues amongst the latter group.

The decision to separate ICT skills from content methods in a teacher education program may not be a matter of discretion for faculty members at some institutions, but in defense of this approach, there are also advantages from a pedagogical perspective. For example, students entering teacher education courses may lack basic ICT skills themselves. A study by Friedman and Kajder (2004) involving students in an introductory educational technology course found that faculty members often assume that incoming teacher education students are more technology savvy than they really are. In fact, most of the participants in the study (90%) reported a lack of confidence as computer users. With this in mind, there is an argument for having students complete one or more introductory ICT subjects, particularly in their first or second year at university, to allow them to come to grips with the basics of the technology. This may be necessary before they can begin to appreciate the possibilities that the technology presents for education. Once they have attained basic ICT competence, they will be better prepared for the “technology infused” methods classes in their third and fourth years.

This having been said, teaching ICT separately from content methods may raise questions in teacher education students’ minds about the relevance of what they are learning about the former. It may also have an impact on their motivation to learn. Students want the course to be reflective of and have a direct connection to their future professional practice (Friedman and Kajder, 2004; 2006). Enrolling in a subject seen as “technical” in nature can also cause additional apprehension unless the tasks they are given are authentic to education/teaching. The present article describes how the authors aimed to address these issues using a project-based approach to assessment and through the involvement of a local high school.

PROJECT-BASED LEARNING IN ICT AND TEACHER EDUCATION

According to the Buck Institute for Education (2002), project-based learning (PBL) is a general term describing an instructional method that uses projects as its central focus. Projects usually emerge out of authentic contexts, address issues that are of pertinence to the community or that are controversial in nature, and unfold in unexpected ways. Over a decade of research into project-based learning at the K-12 level has yielded positive results (Thomas, 2000). At the university level, project-based learning addresses much of what we are learning about what constitutes effective learning, such as active learning, learning with understanding, building on pre-existing knowledge, transfer of learning to applied situations, and the use of technology to support learning (National Research Council, 1999, cited in Cavanaugh, 2004).

Like problem-based learning, project-based learning describes a process of using open-ended or “ill-structured” problems that are deliberately designed to require students to learn content-specific knowledge and problem-solving skills as they seek diverse solutions to meaningful questions authentic to the knowledge domain and/or professional area. Additionally, both approaches value multiple sources of information and performance assessment (Esch, 1998). However, project-based learning differs from problem-based learning in a number of ways. For example, problem-based learning uses scenarios and role-plays to immerse students in a complex, realistic problem, for which they adopt an inquiry approach and present their conclusions, which may not necessarily

include a solution. The emphasis is on the process rather than the end product (Cavanaugh, 2004), unlike project-based learning, which leads students through project development stages that mirror real-world practices. The end result or solution is highly valued in this case.

In line with the constructivist view, project-based learning has students assume a real-life role and apply the tools of the relevant knowledge domain in creating a project, encouraging them to move toward thinking like knowledge domain experts (Cavanaugh, 2004). This can give rise to a host of benefits, including but not limited to only greater retention levels and deeper understanding of the subject matter (Curtis, 2001) as a result of immersion and consequent reflection. This is consistent with Dale's (1946) Cone of Experience, which tells us that people remember "90% of what they do," corresponding to the layers at the base of the cone – Learning is at its optimum when we simulate, model or experience the real thing, or design/perform a presentation. Other benefits of project-based learning are the development of generic skills like research and reporting, presentation and problem-solving, as well as increased self-direction and motivation (The George Lucas Educational Foundation, 2006).

For teacher education students in particular, the use of a project-based approach can not only support their own learning, but can also serve as a model of how they in turn can use the tools, methods and strategies in their own classrooms: "As PBL enhances pre-service teacher learning, its greater value may be in preparing teachers to teach children using project-based methods" (Cavanaugh, 2004, p. 6). In fact, a study by Howard (2002) showed that increasing students' involvement in technology-enhanced project-based learning resulted in a corresponding increase in likelihood that they would apply their learning in their own teaching. DeJong (1999) lists a number of benefits of project-based learning for pre-service teachers:

- Knowledge acquisition across several domains: educational development, learning theory, curriculum, community relations, assessment, and professionalism;
- Learning to integrate information in meaningful ways to create similar learning experiences for their own students;
- Opportunities to practice teamwork/collaboration while working;
- Learning to work autonomously in a professional context.

ITC125 SUBJECT CONTENT AND TEACHING, LEARNING, AND ASSESSMENT STRATEGIES

Subject Content

ITC125 provides a general introduction to Internet and web technology. Students learn about Internet protocols and standards, as well as developing competence in web page construction using the eXtensible Hypertext Markup Language (XHTML) (World Wide Web Consortium, 2002), a reformulation of HTML as an XML application that affords a true separation between the content of a web page and the rules that govern its presentation. They learn how to use online search tools effectively for academic research and reporting purposes, in addition to being introduced to other topics such as online

multimedia, virtual libraries and network publishing. Table 1 lists the topics that comprise the content for ITC125.

Table 1. Topics covered in ITC125 (Atkinson, 2005)

No.	Module Name	Topics Covered
1	Introduction	<ul style="list-style-type: none"> • Networks, history and overview
2	Web Authoring	<ul style="list-style-type: none"> • Introduction to XHTML
3	Locating and Organizing Information on the Web	<ul style="list-style-type: none"> • Search tools
4	Communications	<ul style="list-style-type: none"> • Internet communication services
5	Standards and Protocols	<ul style="list-style-type: none"> • Internet organization and standards • Introduction to Internet protocols
6	Online Multimedia	<ul style="list-style-type: none"> • Online multimedia • Local and remote processing
7	Professional Activities	<ul style="list-style-type: none"> • Network publishing • Professional activities on the Internet
8	The Future	<ul style="list-style-type: none"> • The future

Teaching and Learning Strategies

A resource-based approach was adopted in the teaching and learning of the ITC125 subject content. In addition to weekly, face-to-face lecture and tutorial classes that drew heavily on collaborative learning strategies, students were supplied with a series of online learning modules providing detailed coverage of the various topics (Fig. 1). As there was no prescribed textbook for the subject, the students relied heavily on this resource in their study. In addition to integrating set readings with instructor commentary on each topic, the modules included “workshops” comprising structured activities designed to assist students in developing their understanding of both the theoretical and practical aspects of the subject.

They were also encouraged to access the subject’s online discussion board (forum) to obtain responses to queries they had from the lecturer and other students, as well as to participate in a continual class dialogue to share their reading, experiences and ideas (Fig. 2). For issues of a more “personal” nature, such as matters relating to a student’s own assessment, e-mail was the preferred means of communication.

An online subject outline made available via the university’s in-house learning management system, *my.csu*, served the conduit that tied together all relevant information and resources and made them accessible from a single, central location (Fig. 3).

Figure 1. Example of an online module in ITC125

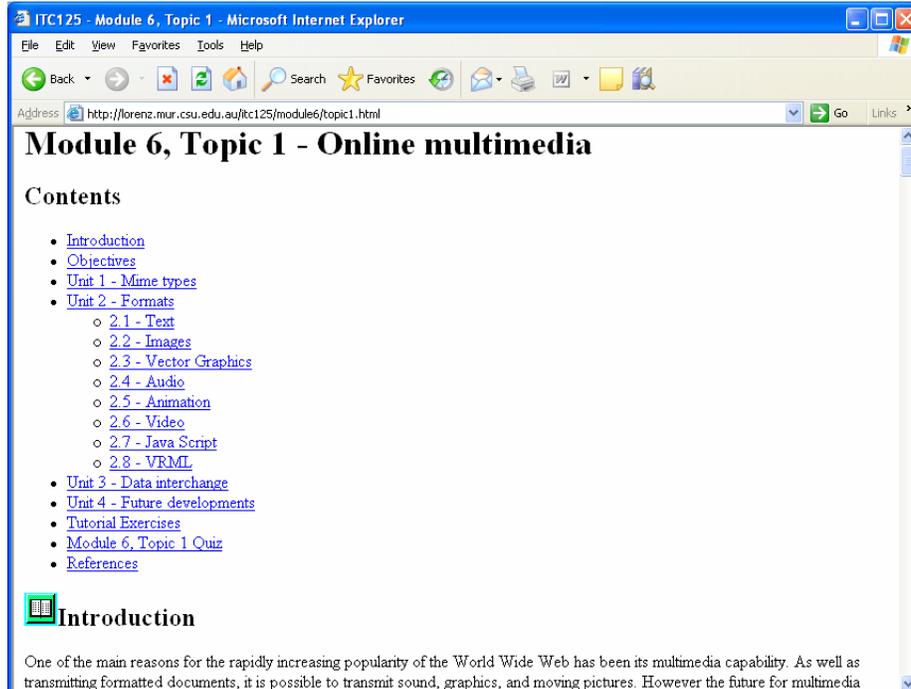


Figure 2. CSU subject forum

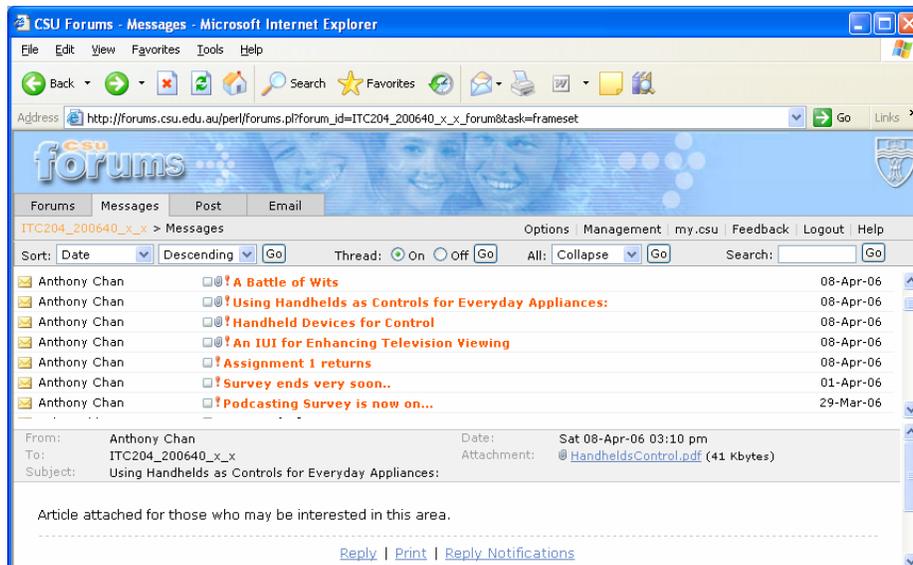
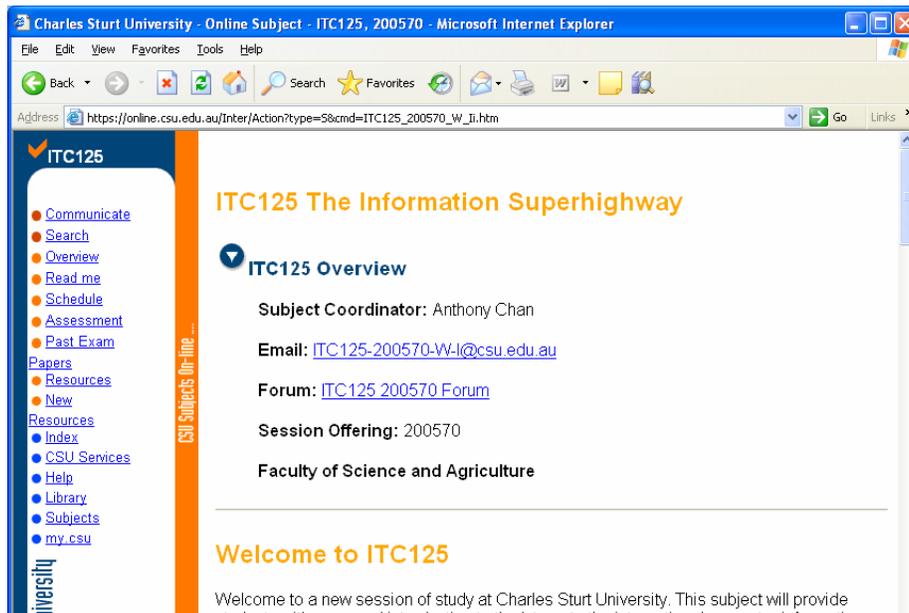


Figure 3. Online subject outline



Assessment Strategies

The assessment for the subject consisted of two equally weighted assignments and a final examination.

Assignment 1: Website, Plan and Presentation. The first assignment was worth 25% of the final grade in the subject, but was marked out of 30. It was designed to give students experience in planning, designing and creating functioning websites, and to develop their understanding of the concepts and difficulties involved in the process. The website had to be created in XHTML using only a simple text editor such as Windows Notepad, rather than a WYSIWYG web page generator like Microsoft FrontPage or Macromedia Dreamweaver. The site was to be uploaded to a web server by means of the File Transfer Protocol (FTP) to be made available for public viewing on the World Wide Web, and validated against the XHTML "Strict" Document Type Definition (DTD) using the W3C's online markup validation service (World Wide Web Consortium, 2005).

Assignment 2: Online Search Report and Essay. In the second assignment, worth 25% of the final grade, students were required to conduct Internet searches to find information on a topic area selected from a given list of topics, for the purpose of writing an essay. A report on the strategy, resources, and procedure used, as well as search refinement techniques employed and results obtained, was to be submitted in addition to the essay itself, which was to be written in academic style. Deliverables were to be presented in web page format and uploaded to a web server for online viewing. For Assignment 2, the teacher education students in the ITC125 class were encouraged to select topics of relevance to their field, such as:

- How to select a career path upon graduation from high school;
- Post-secondary education and training options outside Australia;
- Criteria for the selection of a university;

- Planning financially for post-secondary education (scholarships, grants, etc.);
- Going on an overseas working holiday or “gap year” after finishing Year 12;
- Preparation for university life (researching location, transportation, accommodation, etc.);
- Other relevant topics negotiated with the lecturer.

Final Examination. At the end of the semester, all students sat a three-hour, written, closed book examination, designed to assess the students’ understanding of the fundamental concepts of the subject material and their ability to integrate and apply information from the various topics. The exam consisted of multiple choice and short answer questions, covering the content of the entire subject. This assessment item was worth 50% of the final grade. A passing mark in the exam was required in order to pass the subject.

PROMOTING RELEVANCE AND AUTHENTICITY FOR THE TEACHER EDUCATION STUDENTS

Modeling Effective ICT Integration in Teaching and Learning

Given that the teacher education students studying ITC125 on-campus at CSU-Wagga Wagga were enrolled in the same class as students from other disciplines, it was challenging to cater to their needs and interests without adversely affecting or otherwise disadvantaging the other students in the class. Moreover, ITC125 was also simultaneously being delivered on-campus at two other CSU campuses, in addition to being offered by distance education and taught at “satellite” campuses operated by private partner institutions throughout Australia and overseas. With this in mind, the importance of maintaining consistency in key learning objectives was paramount – Unilateral decisions could not be made, and major changes had to be approved by the subject convener and be put through a fairly lengthy and paperwork-intensive revision process that was unlikely to be completed by the end of the current semester.

In the light of these factors, the lecturer of ITC125 at CSU-Wagga Wagga was unable to make substantial modifications to the subject’s prescribed content. However, as an education graduate and an active practitioner/researcher in the educational technology arena, he makes extensive use of ICT tools and technologies to enhance the teaching and learning process, both inside and outside the physical classroom. Many of these tools and technologies are of direct relevance to the subject content of ITC125, allowing him to teach both about and with the technology. For example, he uses the advanced features of presentation graphics software to prepare visual aids for his lectures, maintains web-based resources to supplement his teaching, and attempts to model best practice in the educational applications of computer-mediated communication (CMC) tools such as discussion boards/forums, instant messaging and e-mail to support his students outside the classroom. He also explores and integrates the use of emergent Internet technologies like podcasting (Chan & Lee, 2005) into his teaching practice. Therefore, throughout the semester he constantly encouraged the teacher education students to observe, discuss and critically reflect on his teaching strategies and methods in general, and in particular his use of ICT. He also asked them to consider how they might adapt and/or apply what they observed to their own future professional practice as teachers. The aforementioned study by Friedman and Kajder (2004) revealed that the majority of the participants in the study

had not experienced effective uses of technology in previous courses (either in K-12 studies or at university), and desired models that illustrated effective technology integration; if this representative of the average teacher education student, there are certainly merits to the ITC125 lecturer’s approach of exposing students to this “expert presentation.”

Using a Project-Based Approach to Assessment

Engaging learners in the assessment process is one of the critical success factors in project-based learning (Doppelt, 2005). The essence of the lecturer’s strategy involved customization and contextualization of the subject’s assessment to promote relevance and authenticity for the teacher education students, without altering the underlying learning objectives specified in the subject profile (i.e., design document). In Assignment 1 (Website, Plan and Presentation), a project-based approach was adopted in which the teacher education students were required to plan and produce a website for a local high school, Wagga Wagga High School (WWHS). Their brief was to design and develop a multimedia website that presents material targeted to students in Years 5 and 6 (typically ages 10 to 12) and their parents/caregivers about various aspects of life in high school. This was deliberately kept somewhat vague and open-ended to encourage them to exercise their consulting skills to elicit the precise requirements from the client. To facilitate the website design and creation process, the students were provided with access to the staff of WWHS, who were to be treated as “clients.”

Han and Bhattacharya (2001) propose a simple, three-phase model for project-based learning that is summarized in Table 2, and which the lecturer adopted as a framework for structuring the teacher education students’ project work.

Table 2. Project-based learning phases (Han and Bhattacharya, 2001)

Planning	<ul style="list-style-type: none"> • Choose topic • Search resources for needed information • Organize resources into usable form
Creating/Implementing	<ul style="list-style-type: none"> • Develop project idea through • Coordinate and blend ideas/contributions of group • Build the project
Processing	<ul style="list-style-type: none"> • Share project and findings with others (other groups, instructor, etc.) • Obtain feedback • Critically reflect on project

Planning phase. The teacher education students were required to write a plan (worth 6 out of the 30 available marks for Assignment 1) that outlined the target audience of the proposed site and its major goals. In order to obtain this information, they had access to “clients” (high school staff) who they were able to interview. The plan also had to include a site design diagram or top-level storyboard identifying the various web pages within the site and the relationships between them in terms of the hyperlinks used to navigate between the pages. Finally, there was to be a section describing the individual pages in terms of content, layout and function. Design decisions had to be justified in terms of the target audience, goals and general principles of good website design.

In planning to create the site, the students were advised to search for resources to assist them. They were encouraged to surf the web and visit the websites of other high schools in Australia and other parts of the world. In examining these sites, they were asked to analyze how the target audience's characteristics, such as culture, gender, age group, may have influenced the content and layout of the site in each case. For advice and "tips" on good website design, the students were directed to a number of useful web-based resources as a starting point, but were also urged to find and make use of other resources.

Creating/implementing phase. Following the planning phase, the students were required to develop the project concept through, coordinating and blending the various ideas that arose from the previous phase into a finished product. To this end, they continued to liaise with their "clients" to confirm/validate and refine the requirements. This typically involved the use of either paper ("throw-away") or on-screen (evolutionary) prototypes. They then proceeded to build the website in XHTML and publish it on the web for public viewing. Assessment criteria for the finished website, which was the main deliverable for Assignment 1 (worth 19 out of 30 marks), included the following: content; layout, navigation and appropriateness; quality and readability of XHTML code (including successful validation against the XHTML Strict DTD); variety of XHTML features used; variety and appropriateness of links; inclusion of proper acknowledgments and references; successful upload of site to a web server.

Processing phase. In this final phase, the students were required to share the outcomes of their project work with not only their classmates and the lecturer, but also with their "client." A small portion of the marks for Assignment 1 (5 out of 30 marks) was allocated to the requirement to deliver a verbal presentation explaining the site and its features, as well as the rationale behind its design, to a panel of WWHS school staff, including the Deputy Principal. This panel scored each student's presentation according to the following criteria: originality of concept; understanding and conveyance of goals of the website; clarity of explanation; professionalism; and timing of presentation. Each panelist also submitted written remarks on each student's website and presentation to the lecturer, who collated and communicated this in the form of constructive feedback to the student. Last but not least, the students were also asked to critically reflect and report on their findings and what they had learned by means of an evaluation form.

The authors of the present article set out to evaluate the following:

1. The degree to which the use of a project-based approach to assessment and the provision of a real context were successful in promoting relevance and authenticity for the teacher education students in the ITC125 subject, which is technical in nature;
2. The benefits of the involvement of the local high school in the teacher education students' projects/assessment;
3. The types of learning that arose from these activities, including the development of both subject content knowledge (ICT/Internet technology) and generic skills, and the application of this learning to the teacher education students' future professional practice.

PARTICIPANTS, CONTEXT, AND METHODS

In the Spring 2005 semester, a total of 31 undergraduate students were enrolled in ITC125 in on-campus mode at CSU's Wagga Wagga campus. Of these students, 20 were initial teacher education students, with the remainder from other disciplines such as business/accounting, science and information technology. The teacher education students consisted of 8 males and 12 females, with the age range being 18 to 43 years.

In the final week of the semester, a paper-based survey (see Appendix A) was distributed during the lecture to only the teacher education students in the class. Participation in the survey was strictly voluntary, and participants had the option of either filling out the survey in class or taking it home to complete. The survey took approximately 10 to 15 minutes to complete. In the first part, participants were asked to respond to a series of statements by rating each statement according to a 5-point Likert scale (1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree). In the second part, participants responded to a series of open-ended questions, intended to obtain richer and deeper insight into their views and experiences in the subject vis-à-vis the aforementioned research objectives.

Descriptive statistics were performed on the quantitative data collected in the survey. For the open-ended responses, a simple content analysis (Patton, 1998) process was employed to identify, code, and categorize primary patterns in the data. The data was initially coded according to the major research objectives listed in the previous section. Sub-categories were then established. The list of categories was gradually refined as subsequent passes were made through the data, with the content being reviewed in greater detail and common strands factored out. As part of this iterative process, categories and sub-categories were added, deleted, renamed, combined, and divided as necessary. Eventually, each response was categorized according to the themes/issues identified, to reveal those themes/issues that were the most pertinent or worthy of mention.

RESULTS AND DISCUSSION

A total of 20 teacher education students submitted responses to the survey, representing a 100% response rate. The responses to the first part of the survey (Likert / rating scale questions) are summarized in Table 3.

The participants were generally in strong agreement that the involvement of the local high school in their first assignment was beneficial in promoting its perceived relevance, as well as in increasing their interest in and motivation towards the project through providing an external audience and a sense of accountability for their work. Most of the participants took advantage of the opportunities to liaise with the high school staff and found this client consultation process useful. They found the feedback provided by the school staff valuable and enjoyed the opportunity to contribute ideas towards an authentic, real-world context.

Table 3. Results of end-of-semester survey (N=20)

	Mean	SD
Assignment 1 – Plan, website and presentation		
1. The involvement of the local high school in my project for Assignment 1 (Plan, Website and Presentation) made it more meaningful and relevant to me.	4.86	0.36
2. I was motivated to work hard in Assignment 1 because I knew I had an external audience for my project.	4.85	0.37
3. The involvement of the school in Assignment 1 made me put in additional effort because it provided a sense of additional accountability for what I was doing.	4.53	0.77
4. I liaised with staff at the school while planning and developing my website for Assignment 1.	4.22	1.00
5. I found it useful to have an external source (client) to consult with while planning and developing my website for Assignment 1.	4.45	0.83
6. I did not benefit from the involvement of the school in Assignment 1.	1.42	0.61
7. The opportunity to present my work in Assignment 1 to the school did not increase my level of interest in the assignment.	1.62	0.80
8. In Assignment 1, I feel the contribution of the school to my marks made the assessment process fairer.	4.10	0.89
9. In Assignment 1, I found the comments/feedback provided by the school valuable.	4.44	1.03
10. I enjoyed the opportunity to contribute new ideas towards a real context related to my future vocation in Assignment 1.	4.62	0.50
11. The involvement of the high school in Assignment 1 enhanced my learning of the subject matter (Internet technologies and web page authoring).	4.50	0.51
12. The involvement of the high school in Assignment 1 helped me learn things that I would not have learned otherwise.	4.26	0.93
13. I feel I am able to apply what I learned from Assignment 1 (Plan, Website and Presentation) to my future professional practice as a teacher.	4.32	0.67
Assignment 2 – Online search report and essay		
14. The guidelines for Assignment 2 (Online search report and Essay) provided me with sufficient flexibility to tailor an assignment that suits my interests and needs.	3.71	0.72
15. I would have preferred to undertake a topic in Assignment 2 that was not related to teaching/education.	2.75	1.37
16. I feel I am able to apply what I learned from Assignment 2 (Online search report and Essay) to my future professional practice as a teacher.	4.33	0.80
Overall		
17. The content of the subject is relevant to my course and future vocation.	4.43	0.51
18. The ability to base my assignments on topics related to my course/vocation made the subject more meaningful and relevant to me.	4.67	0.48
19. I feel that education students should not have to learn about information technology.	1.33	0.48
20. I learn more when I have a real situation to apply my assignment work to.	4.80	0.41

In Assignment 2, participants generally agreed that they were afforded sufficient flexibility to tailor an assignment that suited their needs and interests. Although the data for the statement, “I would have preferred to undertake a topic in Assignment 2 that was not related to teaching/education” leaned more towards disagreement than agreement, the mean was close to the “neutral” mark of 3. Further investigation must be carried out to

ascertain the precise reasons why a small number of the students did not respond positively to these questions.

In both assignments, participants felt confident in being able to apply what they had learned to their future professional practice as teachers, although further investigation must be carried out to ascertain whether or not this learning really translates into real-world application as they enter the profession. The participants were in strong agreement that the ability to base their assignments on topics related to education/teaching made the subject more meaningful and relevant to them personally. Overall, they found the subject and its content relevant to their course and future vocation, despite the fact that the subject content was designed primarily with information technology students in mind.

The second, open-ended part of the survey asked the participants what aspect(s) of the subject's teaching, learning and assessment they saw as being most beneficial to them. They were also asked to provide examples of how they might apply what they learned from the project-based assignments to their future professional practice as teachers. In addition to commending the lecturer on his efforts to make the subject and its content meaningful and relevant through his teaching methods, many of the participants showed positive attitudes and reactions towards the involvement of the local high school in Assignment 1:

The programming part was boring. But the activities around it (having [to] go to the school, meet the teachers, talk to them and work out their needs) was excellent.

I enjoyed this part of the subject [Assignment 1] and could see the relevance after hearing it from the teachers there.

From their responses it was clear that the participants perceived tremendous value and relevance in this assignment, owing directly to the input from and interaction with the school staff. In general, they felt the exercise helped them to develop an awareness of the operations of the school, together with an appreciation of what schools wish to promote to prospective students, their parents, and the wider community, as well as the issues and challenges involved in achieving this. In fact, a few of them explicitly voiced the desire to spend more time with the staff at the school:

... I enjoyed the interaction with the high school; just wished we had more time there.

More time to sit down and discuss [our projects with the school staff]. We had like... 45 minutes only.

The participants were able to list concrete examples of knowledge and skills learned from both assignments, including ideas for incorporating what they had learned into their own classrooms:

Being able to show students how to research a topic on the Net other than Google... e.g. Proquest, Online Journals, Virtual Libraries

[It showed me]... another form of presenting a portfolio for a design project... [that I could potentially use with my own students]

In addition to their subject-specific learning, participants also reported that they were afforded the opportunity to develop generic skills, such as interpersonal communication skills, presentation skills, client consulting skills, and creativity, through their completion of the contextualized assignments:

How to present myself and a topic to an audience

Tailoring to needs/wants [of the client]

Liaison with [high school] teachers

[It encouraged me]... to look outside the square

Finally, a significant number of participants expressed frustration with the technical aspects of the subject, most notably the requirement to hand code the raw XHTML for their web pages:

The subject was far too technical... I am a TAS [Bachelor of Education in Technical and Applied Studies] student. I do metalwork.

... Why do I have to learn programming by Notepad in this day and age?...

... the programming by hand bit [should be removed from the subject]. Use a[n][authoring] tool. That's what the world uses.

In the process of discussing their views and concerns about this facet of the subject and its relevance, several students exhibited sound self-awareness of their own strengths and weaknesses, and demonstrated evidence of having reflected on these in relation to their individual needs and interests. For example:

Working out the needs of the teachers was interesting. I reali[z]ed that I didn't have enough [technical] skills but I don't want to be a tech person or programmer anyway. [However] I appreciate the insight [I have gained] into the process [of authoring web pages with XHTML].

Other participants commented on the implications that teachers' ICT skills and computer/Internet literacy levels have for classroom practice, and in doing so similarly displayed evidence of having critically reflected on their learning and experiences in the subject.

CONCLUSION

Based on the results of the end-of-semester survey, as well as their own observations, the authors believe that the use of contextualized assignments built around a project-based learning approach has largely been successful in promoting relevance and authenticity for initial teacher education students studying a subject designed for information technology students. The involvement of a local high school in the students' project work and assessment was a valuable experience that provided the students with a significant real-world context in which to apply their learning, and a sense of accountability which motivated them to carry out the required tasks.

Although the authors are cautious of making grandiose claims, especially in the light of the small sample size of the study, they believe there are a number of implications for faculty and researchers involved in ICT in teacher education. Firstly, the types of teaching, learning, and assessment strategies described in this article can be of considerable value in pre-service teacher training, particularly when the option of having ICT fully integrated into the curriculum is infeasible or otherwise impractical to implement. The teacher education students in the present study found the project-based tasks challenging and motivating, as evidenced by their responses to the survey as well as their successful completion of the tasks. The approach can allow pre-service teachers to exercise creativity and a range of generic skills while applying and articulating their understanding of ICT concepts, as well as sharing their ideas and outcomes with a real client (the school). This can be an effective way to encourage them to learn *using* and *about* both ICT and project-based learning and integrate them into their future professional practice as teachers. Secondly, the authors believe that without the provision of an authentic context and the presence of an audience whose views and opinions they valued, the participants may not have been as actively engaged in the tasks, and may not have perceived the subject content as being as valuable or relevant. Last but not least, in teaching pre-service educators about ICT, they may become overly focused on the technology. This highlights the importance of scaffolding cognitive behaviors and modeling appropriate pedagogical strategies and uses of the technology (c.f. Friedman & Kajder, 2004; 2006). Pre-service teachers should also be urged to critically evaluate their own use of ICT, and that of others, in relation to accepted educational theories and models (Kenway, 1995).

In the near future, the authors plan to elicit feedback from the school staff on their experience of being involved in the project through a series of one-on-one and focus group interviews. They also intend to conduct a follow-up study of the teacher education students' technology use as they progress into later years of their study program and their teaching practicum in schools. This will allow them to examine the participants' transfer of learning to classrooms and schools (c.f. Howard, 2002).

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Appendix A

Survey questions

Key: SA = Strongly agree, A = Agree, U = Undecided, D = Disagree, SD = Strongly Disagree	SA	A	U	D	SD
1. The content of the subject is relevant to my course and future vocation.					
2. The ability to base my assignments on topics related to my course/vocation made the subject more meaningful and relevant to me.					
3. I feel that education students should not have to learn about information technology.					
4. The involvement of the local high school in my project for Assignment 1 (Plan, Website and Presentation) made it more meaningful and relevant to me.					
5. I was motivated to work hard in Assignment 1 because I knew I had an external audience for my project.					
6. The involvement of the school in Assignment 1 made me put in additional effort because it provided a sense of additional accountability for what I was doing.					
7. I liaised with staff at the school while planning and developing my website for Assignment 1.					
8. I found it useful to have an external source (client) to consult with while planning and developing my website for Assignment 1.					
9. I did not benefit from the involvement of the school in Assignment 1.					
10. The opportunity to present my work in Assignment 1 to the school did not increase my level of interest in the assignment.					
11. In Assignment 1, I feel the contribution of the school to my marks made the assessment process fairer.					
12. In Assignment 1, I found the comments/feedback provided by the school valuable.					
13. I enjoyed the opportunity to contribute new ideas towards a real context related to my future vocation in Assignment 1.					
14. I learn more when I have a real situation to apply my assignment work to.					
15. The involvement of the high school in Assignment 1 enhanced my learning of the subject matter (Internet technologies and web page authoring).					
16. The involvement of the high school in Assignment 1 helped me learn things that I would not have learnt otherwise.					
17. I feel I am able to apply what I learnt from Assignment 1 (Plan, Website and Presentation) to my future professional practice as a teacher.					
18. The guidelines for Assignment 2 (Online search report and Essay) provided me with sufficient flexibility to tailor an assignment that suits my interests and needs.					
19. I would have preferred to undertake a topic in Assignment 2 that was not related to teaching/education.					
20. I feel I am able to apply what I learnt from Assignment 2 (Online search report and Essay) to my future professional practice as a teacher.					

21. ITC125 is a technical subject, originally designed for information technology students. Did you find the subject relevant to you as an education student? Why or why not?
22. What did you learn from *Assignment 1 – Plan, website and presentation*?
23. Give examples of what you learned from the involvement of the school in Assignment 1 that you would otherwise not have.
24. What did you learn from *Assignment 2 – Online search report and essay*?
25. Give examples of how you might apply what you learnt from each assignment to your future professional practice as a teacher.
26. What changes/improvements would you suggest in the *subject content* and *assignments* for ITC125, to make it more suitable for and relevant to education students?
27. What changes/improvements would you suggest in the assignments for this subject, to make it more suitable and relevant to education students?
28. Do you have any other comments to add in relation to the content and assessment strategies used in the subject, in relation to education students?