

AUTC ICTEd Project

Stage 2 Report

Computing Education Research Group

Monash University

Selby Markham

John Hurst

Janet Munro

1 Introduction

The report presented here is for the second stage of the Australian University Teaching Committee funded project on the Learning Outcomes and Curriculum Development in Major University Disciplines in Information and Communication Technology (ICTed). Stage one of the project was completed in 2001 and is reported in Hurst, Lynch and Collins (2001). Stage two was designed as a direct follow-on from the first stage.

Stage one of the ICTed project, using a variety of methodologies, explored the nature of curriculum development within the context of innovation and best practice as well as investigating the way the ICT industry was responding to the current graduate output from the universities. This was rounded off with a limited study of graduate perceptions of their course, with particular reference to possible influences on entrepreneurial skills.

The results from the first stage established that a core of ICT educators was, in fact, strongly involved in curriculum development. The level of innovation and the level of teaching best practice is not easy to determine. It has been noted by Rogers (1983) that any attempt to define innovation is best to be done the local level rather than at wider, for example national, levels. The ICTed project was defined as a national project, therefore the research group was obliged to investigate innovation at this level.

The complexities of the findings on Stage One are difficult to summarise at this point. The material presented by the participants in the workshops pointed to a variety of problems associated with being an ICT academic who was interested in developing educational issues. For example, many of the academics pointed to the isolation that they felt from central information sources about education, education innovation and educational best practice. They also pointed to shortcomings in their own background; shortcomings starting from the fact that they are not educationists rather ICT academics who were interested in educational issues. One key area of shortcoming that was mentioned regularly was their lack of knowledge of educational or programme evaluation techniques.

The report being presented here has little theoretical content. It is basically about a series of practical exercises designed to help build a supportive environment for educators who are concerned about best practice in education and are interested in exploring innovative educational activities.

2 Background

2.1 The ICTed Project

This national study was undertaken as a result of a grant from the Department of Education, Training and Youth Affairs, through the Australian University Teaching Committee (AUTC). The aim was to investigate the ways that teaching and learning are being approached in the major discipline of Information and Communication Technology (ICT) in Australian universities. The purpose of the project was to provide information to the AUTC that would assist the Committee in its promotion and support of excellence in university teaching.

The study was designed in response to a Project Brief (reproduced here as Appendix 1). A Research Team, comprising a senior research fellow, a research assistant and an administrative assistant, was commissioned to administer and manage the implementation of the research. A Reference Group (see Appendix A in Hurst et al., (2001) for a membership list), comprising members of the Monash University Computing Education Research Group, was formed to oversee and manage the overall project. A National Steering Committee, comprising representatives from the funding body, was appointed to provide general advice and support for the project and to ensure that the project meets its aims within the proposed timeline and budget, in accordance with the brief and requirements of the grant agreement.

The Project aimed to maximise the cooperative input from ICT departments and faculties across Australia as well as involving employers and graduates in a constructive way. Eighty-three ICT educators from 29 universities contributed to the data collected by the Project (see Appendix B in Hurst et al., (2001) for participant list). Ten senior ICT academics and one international ICT educator (see Appendix C for participant list) contributed to the Project outcomes by reviewing the recommendations made and identifying implementation issues. This high level of consultation and collaboration with those with interests in the ICT discipline has resulted in research outcomes and recommendations that are both relevant and credible.

The background to this report, the project specifications and the structure of the report are described below.

2.2 Background and project specifications

2.2.1 Australian University Teaching Committee

In January 2000, the minister for Education, Training and Youth Affairs established the Australian University Teaching Committee, a national body aimed at improving Australian university teaching and learning. During 2000 the AUTC commissioned a small number of projects to focus on issues of teaching and learning within major disciplinary areas, with a view to learning more about the ways in which teaching and learning have been approached.

In 2001 this group reported on their research project focusing on the major interdisciplinary area of Information and Communication Technology (ICT) education. The research undertaken in Stage 1 comprised a review whose purpose was to identify the extent to which innovations in teaching and learning and processes of curriculum development and review have been deployed in response to the needs of students and employers.

As a result of the work undertaken in Stage 1 the group were commissioned to undertake stage 2 to disseminate innovative and best practice ICT teaching through the provision of a website, conduct of workshops through Australia, and the improvement of standards of evaluation of ICT curricula.

2.2.2 Research specifications

The Brief for this project (Australian University Teaching Committee 2000) is wide-ranging and, while its focus is on issues of teaching and learning, the role of graduate and employer satisfaction, academic staff shortages and professional development, the assessment of quality teaching and the dissemination of innovation are also important elements. Crouch and McColl (2001) noted that in commissioned studies involving a high level of collaboration among diverse stakeholders, with multiple policy and practice expectations, it is useful to “distinguish between the aims of the broader project, in which the research [sits] and for which particular audiences could be identified, and the specific aims and objectives of the research itself” (p.3). The tender document (Computing Education Research Group 2000) for the project specified research activities that would be used to meet various elements of the Brief. These activities, including the specific aims of each activity, are summarised in Table 1.

2.3 Stage Two Objectives

The core aim of stage two was to disseminate the Stage One results. The proposal accepted by AUTC defined dissemination in three different ways:

- 1) The first approach was based upon running workshops at locations where projects that were innovative and/or best practice could be presented to a group for the group’s comments and for the group’s interpretation of the material within their own educational environment.
- 2) The second approach proposed that a database be built that will allow for educators to present their material to the rest of the academic community.
- 3) The third approach was a direct consequence of a finding from stage two where it became clear that many academics in the ICT area have little understanding or training in educational evaluation methods. Consequently it was decided that a user oriented website should be developed that would give ICT educators access to basic information and techniques about educational evaluation.

3 Design Issues

3.1 Introduction

ICT-Ed is a national project that was undertaken

“as a result of a grant from the Department of Education, Training and Youth Affairs, through the Australian University Teaching Committee (AUTC). The aim (of the first stage undertaken in 2001) was to investigate the ways that teaching and learning are being approached in the major discipline of Information and Communication Technology (ICT) in Australian universities. The purpose of the project was to provide information to the AUTC that would assist the Committee in its promotion and support of excellence in university teaching”

(Hurst et al., 2001; p.1). Following on from that work further funds were made available to disseminate innovative teaching ideas within the ICT discipline area. This section focusses upon the design of the website of innovative and best practice teaching materials.

| Area | Aims | Outcomes |
|---------------------------------|--|---|
| Establishing parameters | To make contact with ICT departments in Australian universities | Database containing contact details for all department heads Written communication with all department heads, announcing project Written communication with all department heads, inviting participation in the consultation phase. |
| | To develop a Web site for disseminating information and collecting data | Web site developed at http://cerg.infotech.monash.edu.au/ icted including general project information, contact information and an inquiry form Web site development continued over life of project |
| | To review literature that would inform subsequent phases | Literature reviewed on <ul style="list-style-type: none"> • Educational innovation and good practice in ICT education • Industry needs and employer satisfaction • Graduate behaviour and graduate satisfaction |
| Consultation with ICT educators | To investigate current innovations in ICT education | Mini-conferences held in each capital city Data collected via mini-conference presentations provided an overview of ICT educators' innovative activities |
| | To investigate ICT educators' views on developments in teaching and learning and the dissemination of innovation | Data collected via mini-conference open discussions provided a picture of ICT educators' views about the directions of innovation and the dissemination of innovation |
| | To create a positive feel for the project among ICT educators | Mini-conferences involved quality engagement with ICT educators and received positive feedback. A broad range of academic levels attended, from a large number of departments. |

Table 1. Project aims and outcomes

3.2 Characteristics of ICT

The ICT discipline has changed rapidly since its inception with major changes in hardware or software occurring every few years. Each change puts pressure on ICT educators to develop new course material (Hurst et al., 2001; p.52). This changing technology forces educators to become self-learners (McInnis, 1999; p xiv). The nature of the ICT teaching material exacerbates the problem, since (for example), instruction in topics such as the use of the Web are more detailed than the prescriptive approaches taken for other disciplines.

3.3 Findings from Stage 1 that influenced our design

Mini-conferences, attended by ICT educators, were held through out Australia during stage 1 of the ICT-Ed project, undertaken in 2001. One aim of the mini-conferences was to identify ICT educators' perceptions of factors inhibiting the development of innovations and best practice in the ICT discipline. Participants identified the major problems with developing innovative material as the lack of resources, time, lack of expertise in programming and unavailability of hardware to develop material. Other research takes this further, finding that ICT lecturers who develop new material increase their work hours substantially (McInnis 1999; p xiv). Participants also reported that the lower status of teaching compared to research and the difficulty in getting recognition for the efforts expended in developing new teaching material with promotion often tied to developing a research profile were potential barriers inhibiting innovation. Additionally ICT educators lacked training in educational evaluation, which lead to difficulties in understanding the effectiveness of their programs and to reporting the outcomes of their programs (Hurst et al., 2001; p. 88).

“Enhancing curriculum is a task that falls more heavily on the shoulders of junior staff” (raw data from research transcripts).

Mini-conference participants reported that the most effective communication channels were face to face informal discussions. At Monash University, like other universities, conference attendance is contingent upon presenting papers at E1 conferences, which limits curriculum innovators opportunities to meet with their peers and engage in face to face informal communication. Consequently ICT curriculum developers often work in isolation.

Other factors that impeded the dissemination of information included the professional risks involved in sharing teaching innovations with peers are that their innovations would be appropriated by their colleagues, thus diminishing their competitive edge (Hurst et al., 2001; p. 88). Participants echoed Taylor's assertion (Taylor, 1999) that a barrier to university teaching is academics reluctance to use pre packaged materials thus the design permits addition of incomplete materials to database (Hurst et al., 2001; p.94).

Mini-conferences also provided a forum for the educators to report on their own teaching and learning initiatives. Analysis of the descriptions of the innovations collected at these events highlighted the lack of a commonly understood idea about innovative or best practice material (Hurst et al., 2001; p.78) The concept of what constitutes innovation is determined by the context within which one is viewing the innovation. Rogers points out that judgements about whether a particular idea is new are subjective “it matters little, so far as human behaviour is concerned, whether or not an idea is ‘objectively’ new ... if the idea seems new to an individual, it is an innovation” (Rogers 1983 p11). It is more feasible, however, to determine whether an idea is seen as innovative within a particular community because individuals within a community have a “degree of shared interests, shared experiences and familiarity with activities within that community”.

3.4 Stage 2 – 2002 – dissemination and sharing of innovative ICT teaching materials

The second stage of this project concentrates on diffusion of ICT innovation. The aims were to

- build a repository of teaching materials on the Internet for use by staff and students,
- foster a sense of community amongst the ICT educators involved in curriculum development,
- promote the existence of the repository amongst ICT educators, and
- enhance their professional profiles by providing tools to help turn curriculum development into a valid field of scholarship.

The philosophy behind the design is to build a community of ICT educators who are collaborating to develop innovative or best practice teaching curriculum. This will assist in developing a consensus about what constitutes innovation. ICT educators will be more likely to collaborate in the development of material if it can be properly attributed by people who adopt it.

The deliverables for 2002 are the database of teaching materials, the reviews of those materials and the conduct of workshops to demonstrate usage of the material.

The database of teaching materials follows Taylor & Richardson's (2001) model contains the teaching material or a link to a website containing that material, the rationale for including this material, specification of limitations on the material and discussion of outcomes of in-progress or completed evaluations. Any one can upload teaching material and all material in the database is in the public arena. There is no restriction on the type of material that can be included and the database could contain

- websites that contain their subjects teaching materials or software tools used to manage their subject,
- teaching ideas that have been trialled with (or without) evaluations of the approach
- modules to be incorporated in a ICT framework, eg bits of Java code for inclusion in lecture about functional libraries
- Sharing of ideas – requests for collaboration

It is envisaged that material will progress through the lifecycle of innovation, to established practice to part of the infrastructure and then become superceded, as happened with innovations identified in stage 1.

3.4.1 Encourage ICT educators to contribute their work

The ICT-Ed team has had informal discussions with people involved with similar projects and one of the key problems is soliciting teaching material from ICT lecturers for inclusion on the web. Many web based teaching resources have a long lead time. It is not unheard of for the time taken from inception to delivery of the teaching material in web format to be 5 years. This time frame is clearly not viable in the ICT arena. We noted that some projects had detailed formatting requirements for including material on the database, and these requirements are seen to be too onerous by ICT educators who would not want to develop the material twice.

3.5 Peer review

Taylor (2002) contends that peer review should be the appropriate tool for establishing value of scholarly pursuit. He observed that “while academics express few concerns about peer scrutiny of research activities, many tend to be sceptical of peer review involving teaching” (Taylor, 2002, pp 656). This project uses peer reviewers who self nominate. The review questions have been simplified because many ICT educators have low levels of familiarity with education theory, few people will be exposed to face to face training in use of the repository. Furthermore, as it is a web-based medium we need to reduce the risk of the reviewer clicking off to another part of Internet because they find the review is too hard. The reviews are identified, so the comments can be interpreted in the light of the reviewer’s reputation. It is envisaged that some reviewers will contact the author(s) of material directly via email with their comments.

Peer review was selected to help build an Internet community of interest. Allowing reviewers to self select will engage more of the junior academics who shoulder the burden of course development. Self nomination will enable interested academics to flag their interest and will identify other people with expertise in the innovative area. By allowing all readers to potentially participate in the content of the web site the designers hope to build a community of interest for the exchange of, and improvement to, innovative ICT education material. The reviewers nominate whether the material should remain in the public arena, and the author is notified by email so they can modify material in the light of adverse comment. The reviews for a project are summarised below.

| Reader Reviews Summary | | | | | | | |
|---|------------|--|--------------------------|--------------------------|---------------|------------------|------------------------|
| Project: WIER | | | | | | | |
| Reviewer | University | Overall Recommendation | Sound Teaching Rationale | Achieve Learning Outcome | Best Practice | Generalisability | Needs Expert Knowledge |
| Janet Munro | Monash | Accepted | 4 | 4 | 4 | - | - |
| Judy Sheard | Monash | Accepted | 5 | 5 | 5 | Yes | Yes |
| Discussion of Improvements | | | | | | | |
| Judy Sheard (Monash) | | regular reporting of student outcomes | | | | | |
| This material is similar to material at | | | | | | | |
| No comment. | | | | | | | |
| Reference for Similar Research | | | | | | | |
| No comment. | | | | | | | |
| Contacts for Similar Research | | | | | | | |
| Judy Sheard (Monash) | | jlampe@deakin.edu.au | | | | | |
| Generalisability | | | | | | | |
| Judy Sheard (Monash) | | web pages can be easily modified | | | | | |
| Area of Expert Knowledge | | | | | | | |
| Judy Sheard (Monash) | | a dedicated programmer took 12 months to build this site | | | | | |

Figure 1: Reader Reviews Summary

The website is designed to be self governing as far as possible to reduce the administrative load on the part time administrator of the host server and to allow communities of interest to grow without inhibition. The web site reference group is not confident that they can find reviewers committed to review the innovative work without usual compensation that goes with reviewing or editing articles for prestigious journals.

3.6 Future directions

This project will be promoted through the conduct of workshops around Australia, where participants will be encouraged the submission of innovative work-in-progress. The web site will then be evaluated to measure its impact on ICT educators and its effects on teaching ICT. A further stage is to build the Evaluation website that contains material to improve educators understanding and use of evaluation in their curriculum design.

3.7 Conclusions

The vision is of lecturers in different locations around Australia collaborating to develop innovative ICT curriculum for their students by using the ICT-Ed website as a forum to post ideas and material. Material from the web site will be re-used with proper acknowledgment. Using the evaluation web site, the curriculum developers will have improved their evaluation skills so that they can cite their teaching materials on peer reviewed websites to gain promotion. Once curriculum development is accorded proper recognition as a valid field of scholarly endeavour, developers of teaching material will gain recognition for effort expended and the quality ICT teaching at university level should improve.

4 Dissemination workshops

4.1 Overview of workshops

Workshops were conducted around Australia to disseminate the ICTed project work. The workshops were designed: to increase educators knowledge of evaluation techniques; to introduce ICT educators to the ICTed project repository and the evaluation website; and to keep abreast of iCT educators innovators in the 12 months since mini conferences.

4.2 Process

- Invite lecturers on email list to attend workshop
- Where sufficient interest shown, conducted a workshop
- Select 2 presenters for each location, taking care to select ICT educators rather than educators using ICT, trying to get different presenters from 2001 and broaden the number of universities involved
- Different facilitators with higher education qualifications conducted the workshops

Workshops were conducted in 4 hour time slots, and each workshop was structured in two parts.

In part one, two projects were presented, focussing on the innovative aspects and the evaluation of the projects. There was an opportunity for questions, and a brief summary given by the ICT-Ed facilitator, after each presentation.

Part two focused on the discussion of participants' projects, in particular discussion of possible evaluation requirements and strategies for such projects. Participants who have projects that support teaching innovation were requested to bring details of those projects for discussion.

The session was as 'concretely' oriented as possible, and as interactive as possible. Towards that end, we would like the session to begin with a couple of brief presentations from two of the participants, in which each says something about a project in which they are currently involved, but focussing on what they did/do to decide whether things are working.

4.3 Workshop Outcomes

Some facilitators were dissatisfied with the conduct of the workshops. Some presenters felt uncomfortable describing their teaching projects to audience members from more august universities and to people more familiar with the Australian educational merry go round. Facilitators who wanted to customise the workshops to fit their own expertise were annoyed at the briefing provided to presenters by the workshop organiser.

The Brisbane and Launceston participants were impressed with the workshop facilitators ability to add value to their own project. The Brisbane participants wanted more information about the status of the ICTed project and the Launceston participants were surprised and pleased that their compulsory workshop was useful.

A positive response from the Perth workshop was a request for more workshops, as it was felt to be very effective. This was unfortunately outside the scope of the project.

4.4 Details of Some of the Workshops

4.4.1 Brisbane Workshop

Facilitator: Malcolm Eley

Location / city: Brisbane

Date: 30 Sep 2002

Number of participants: 9

Names of participants: Craig Zimitat, Carol Bowie (Griffith), Michael Adams, Tony Sahama, Sue Buzer, Duncan Nulty (QUT), Lynne Chapman (New England), Two others (no record of names) from Southern Cross

Project A: Presenter Michael Adams

Description of project

Students work in small groups of 5 on a series of 3 problems during the semester, in a modified PBL design.

Project B: Presenter Tony Sahama

Description of project

The development of laboratory based, real time assessments, using immediate machine-based feedback on code verification/testing. Partly as a response to observed high frequency plagiarism problems

4.4.1.1 Description of Workshop

The Adams presentation was ‘spot on’, and fed very well into notions of delineating objectives/concerns/issues, and the determination of possible targeted information sources. This allowed the facilitator to do a ‘whiteboard’ exercise to pick up on some specific concrete instances drawn from Adams’ presentation, to illustrate goals and data.

The Sahama presentation was unfortunately ‘off target’. So the ‘whiteboarding’ exercise was replaced with the facilitator asking the presenter some very targeted questions. The intent was to ‘force’ Sahama to articulate what were his instructional goals and issues, and similarly ‘force’ him to articulate some information sources that he’d used. Some of the time this was thrown open to the larger group to speculate on what information sources might be possible for a given goal. However, even though this episode didn’t exactly work to plan, the outcomes were nonetheless good. Again, the importance of articulating goals/issues/questions, and of selecting appropriate targeted information sources came out well, even if by virtue of their not having been made clear to begin with.

The small group section worked well. The group was subdivided into three groups of three. Before beginning their ‘within-group’ discussions, everyone was asked to respond to the ‘briefing’ for the task as individuals. This meant that the group discussion could begin in substantive fashion with people reporting something that they had just considered. There was minimal ‘bumping about in the fog’.

The small group activity was allowed to run on ‘over time’. This meant that the plenary needed to be more focussed than a ‘reporting back of what happened’. The focus used was to have people report on particularly ‘novel’, or ‘out of the ordinary’ information sources that had come up. Ideas on particularly interesting ways of informing on an evaluation issue or question. This meant that we could spend the now limited time looking at fewer ‘offerings’, but those offerings were of greater ‘educative value’ in terms of broadening people’s ideas on what is possible in evaluating projects.

4.4.2 Launceston Workshop

| | |
|--------------------------------|--|
| Facilitator: | Malcolm Eley |
| Location / city: | Launceston |
| Date: | 03 Oct 2002 |
| Number of participants: | 7 |
| Names of participants: | Mike Cameron-Jone, Shuxiang Xu, Pam Davies, Jacky Hartnett, Nicole Clark, Brian Belcher, all of UTas Launceston. Susan Shann from University of Adelaide. The Launceston head of school came for the first half. |
| Project A: | Presenter Nicole Clark |
| | Description of project Software Engineering projects, set up so that the student groups’ progress through the project was ‘iterative’ or ‘staged’ |
| Project B: | Presenter Jacky Hartnett |
| | Description of project Small group project activity centred on developing ‘security systems’ for hypothetical clients. The emphasis was on the broader security context, the intent being to get the students to think beyond just software or info sys responses. |

4.4.2.1 Description of Workshop

Both presentations went perfectly to expectations. Both gave rise to ‘evaluation issues’ that were a bit ‘peculiar’, thus demonstrating the need to go beyond the obvious in teasing out issues and assumptions. Both gave rise to needs to devise inventive ways of gathering and interpreting information related to those issues.

The small group section also went pretty much to plan. Again, participants were set to responding to the task brief individually first, before they began their in-group discussions. Again this worked well to focus the discussion quite quickly.

One interesting ‘mid-direction’ that came up in one of the groups was one individual who found it very difficult to go beyond the ‘learning outcomes’ that he held for his students, when trying to articulate ‘project goals’. The problem boiled down to him using the term ‘goals’ in a very constrained fashion. So we got around it by re-casting things in terms of assumptions and expectations associated with his project approaches and strategies. It was easier than trying to shift his personal lexicon, and it worked in that he got onto what we wanted him to get onto.

The plenary session gave rise to a number of ‘extension’ issues that allowed some extra bits to be inserted. One was to do with the psychometric properties of different question formats in student questionnaires, and how some forms can give you more discriminative response data than others. Another was how doing evaluative activities might need to take account of local, political sensitivities related to staff appraisal processes; especially in relation to whom you ask to give you various sorts of peer comment and feedback.

4.4.3 Perth Workshop

Facilitator: Selby Markham supported by LinHai
Location / city: Perth, WA
Date: 04 Oct 2002
Number of participants: 11
Names of participants: Jocelyn Armarego (Murdoch), Jan Dook (UWA), Sam Downes (Murdoch), Lynne Fowler (Murdoch), Hiew Hong Liang (Murdoch), Kate Lowe (Murdoch), Shri Rai (Murdoch), Elizabeth Santhanam(UWA), Fay Sudweeks (Murdoch), Sabbia Tilli (UWA), Eileen Thompson (UWA)

Project A: Presenter Lynne Fowler (Murdoch)

Description of project

Learning styles in CSSE teaching: The theme of the project is the value in understanding learning styles to help staff focus upon the development of teaching materials that is appropriate to students to enhance learner-centred knowledge acquisition.

Project B: Presenter Jocelyn Armarego (Murdoch)

Description of project

Constructing software knowledge engineering: This presentation was particularly interesting because it looked at the development of course units for software engineering subjects that were based upon a self-managed learning pedagogy. Jocelyn demonstrated some innovative tools that help structure the materials for the students including an 'underground' map of the internal structure of the subject.

4.4.3.1 Description of Workshop

The workshop setup and startup went well due to the interest and cooperation of the staff in the Murdoch Teaching & Learning Centre. There were minor hassles with computer compatibility.

Most attendees arrived within time although some had to leave early.

The presenters were well to over prepared but their presentations were coherent and well received.

The participants were keen to get ideas and information and this was clearly shown in the problem solving session. The level of mutual support and exchange of information suggested a real need for support in project evaluation design.

The wind down over lunch continued the general learning experiences.

4.4.3.2 Outcomes

The responses to the workshop were unanimously positive. Two participants ended up with plans of action for their current work.

A degree of networking that will possibly be across Murdoch and UWA.

The question was asked 'When are you going to run another workshop?'

4.4.3.3 Follow-up

There has been some (limited) follow-up as the local networking was potentially constructive.

A consequence of the workshop was that LinHai, our Chinese visiting scholar who co-lead the workshop, found some excellent materials to add to his research into distance education.

5 Innovation web site

Stated need by ICT academics for wider contact to reduce a sense of isolation led to the proposal that there be a web site which allowed academics to both publicise their own work and review the work of others teaching in the area. The proposed website was designed to serve a variety of functions but focused upon providing a user oriented interface that was not excessively time-consuming or difficult to utilise.

There are, under various auspices, other websites which are designed to allow staff to record curriculum materials and generally provide repository for staff to access to be able to incorporate different curriculum materials into their teaching. Most of these websites appear to have been developed under the general philosophy that they should be extensive repositories of information. That is, as much as possible and the information is directly stored on the website for access by others rather than having a site where the basic information is stored and where the user wants more detailed information this is accessed through links to other sources. The impression has been gained that a number of these websites have found it difficult to encourage academics to spend time making exetnisive entries. That time involved simply does not, it would appear, reflect on the likely benefit from participation in that storage facility.

5.1 Design Issues

Many of the ICT educators encountered by the project team were unfamiliar with educational theory and often did not have an educational background. Because the project team were not providing training in educational theory, it made little sense to attempt to use complex and (educationally) directed peer review processes within the web site.

ICT educators often had no clear idea of how innovation their work was, and were not aware of how it might relate to other work being undertaken throughout Australia. They were not immediately in a position to review adequately either their own material (*self review*), or that of others (*peer review*), both essential activities if the website is to be able to identify quality materials.

Because of the rapidity of change within the ICT disciplines, one could not guarantee to always find external panels of experts to review material. Also, because of this same rapidity of change, it was thought it better to allow any material to be viewable thus potentially shared between colleagues, rather than to only include material that had been vetted and reviewed.

Taking these factors into consideration, the Innovation website was designed with a minimalist philosophy. Storage of detailed material would be kept to an absolute minimum and the site would rely on participating academics to provide effective contact information. Furthermore, based upon the assumption that there would be no further funding to maintain the website, its structure would be as self-managing as was feasible given the technology and the nature of the data-base.

The design assumed that any one could review the material on the website. All material in the website is in the public domain, hence it was seen as unnecessary to make a separation between peer reviewed material and material under review. The lack of on-going full time administrative support for subsequent maintenance of the site also meant that we had to frame the design of the site in such a way that it could be maintained remotely by the users of the site themselves.

5.2 Defining and building the website

The project team was in general agreement about the type of website needed for this stage of the project. A series of specifications were drawn up and mockup screens created. This then evolved into a generally well structured idea on how the group would achieve its ends.

A critical decision in attempting to define the structure of the database that of defining the type of data so that users could gain maximum information from accessing an entry. Our intention was to encourage those depositing data to input just enough information so that the person searching the database would obtain a quick and useful understanding of what an entry was all about. To this end, we developed a balance between system defined categories and short descriptions from the depositor.

The website is accessible via the URL:

<http://cerg.csse.monash.edu.au/icted/bestpractice/>¹

¹ <http://cerg.csse.monash.edu.au/icted/bestpractice/>

6 Evaluation

6.1 Evaluation techniques web site

Any attempt to build an evaluation oriented website has the difficulty that there is no single well defined approach to evaluation either at the theoretical or at the practical level. Those are data bases that exist on the Web tended to be created for those who have some knowledge of evaluation approaches. Essentially, they tend to be rather complicated in layout and lack practical structured, guidance for potential uses.

In ICTed evaluation website was titled The Evaluation Resource Centre to emphasise the fact that this was not a simple repository of all of technical information rather it was a centre that provided resources to a user.

6.2 Website structure

The map of the website illustrates the underlying philosophy for the development of a site. It is broken up into four main area is: definitions, design, running & analysis.

6.2.1 Definitions

The content in this section focuses upon giving a visitor a view of the ways in which evaluation can be conceptualised. But rather than going into the approaches usually presented, it takes a process-oriented approach. That is, it uses a classification that looks at the intent and needs of the evaluator. This incorporates the theoretical material without emphasising them.

At the background of the web site is a set of self-evaluation screen that help evaluators look at the level of skill they have in carrying out evaluations. We believe that teachers should limit their evaluations processes to reflect their skills. This includes disregarding theory-driven methods in favour of those that can be realistically completed.

6.2.2 Design

The section on design ranged from an overall discussion of evaluation design in the real academic world to some particular methods and approaches. The former has been discussed under the following headings:

- Desperation Model
- Economy Model
- Mid-range Model
- Top of the range model
- Designer model

The emphasis in these sections is upon the evaluator being aware of his/her limitations and using whatever resources that are available.

When dealing with the actual design process, emphasis has been place upon the user establish clear and definable objectives for carrying out an evaluation.

The tools provided are designed to be practicable rather than theoretically sophisticated. They also reflect the likely skill level of the non-specialist evaluator. For example, Focus Groups are not described because most academics outside certain areas of the social sciences lack the intensive group skills needed to run such groups.

6.2.3 Running

This is a relatively small area of the resource site.

6.2.4 Analysing

The analysis component of the site focuses upon specific skills. For example, basic Content Analysis is emphasised for working with qualitative data.

6.2.5 Location

The web site is located at:

<http://cerg.csse.monash.edu.au/evaluation/>²

7 Conclusions

Stage 2 of the project was not as successful as stage 1 for a number of reasons:

- 1) It proved difficult to find skills suitable for the comprehensive approach required to address all the design issues of the project. Managing the project, facilitating the workshops, and developing the website required a range of skills that were not easy to find within the resourcing available to the project.
- 2) The innovation website suffered from a lack of awareness, and has been little used, except by those intimately associated with the project. The irony of having a web site to disseminate information about best practice, and having no effective way of disseminating information that the web resource was available has not been lost on the project participants!
- 3) A similar comment can be made about the evaluation website. An analysis of the logfiles for the first half of 2004 yields the following number of hits on the website:

| week ending | number of hits | week ending | number of hits |
|--------------------|-----------------------|--------------------|-----------------------|
| 18 Jan 2004 | 150 | 25 Apr 2004 | 166 |
| 25 Jan 2004 | 93 | 02 May 2004 | 777 |
| 01 Feb 2004 | 125 | 09 May 2004 | 1303 |
| 08 Feb 2004 | 140 | 16 May 2004 | 381 |
| 15 Feb 2004 | 169 | 23 May 2004 | 1424 |
| 22 Feb 2004 | 89 | 30 May 2004 | 5194 |
| 29 Feb 2004 | 106 | 06 Jun 2004 | 943 |
| 07 Mar 2004 | 154 | 13 Jun 2004 | 303 |
| 14 Mar 2004 | 131 | 20 Jun 2004 | 1409 |
| 21 Mar 2004 | 752 | 27 Jun 2004 | 168 |
| 28 Mar 2004 | 1301 | 04 Jul 2004 | 116 |
| 04 Apr 2004 | 180 | 11 Jul 2004 | 109 |
| 11 Apr 2004 | 268 | 18 Jul 2004 | 351 |
| 18 Apr 2004 | 195 | 25 Jul 2004 | 2430 |

The underlying pattern to this shows some consistent activity, but by no means can the use of the website be said to be growing.

Several conclusions can be drawn, and have influenced subsequent thinking:

- 1) The 'Not Invented Here' syndrome applies to many academics in their use of teaching innovations. These reasons for this are understandable, although not justifiable. Academics are rewarded for innovation, and copying or adapting others work does not usually lead to positive outcomes in terms of promotion or recognition. It also often discouraged by university management, who see 'commercial in confidence' and 'loss of branding' issues in such reuse.
- 2) Scholarship in teaching must be seen in the same way as scholarship in research. This means the wider adoption of peer review, citation of others work, and advancement of the state of knowledge. All these things are possible in the teaching context, it is really the attitudes of both staff and management that limit their wider adoption.
- 3) Academics have been even more 'time poor' than they used to be. Additional tasks occasioned by new technology or new pedagogy get short shrift, since a decision usually has to be made about what other tasks are given lower priority to make way for the new. Without clear outcomes for making those decisions, the status quo usually prevails.

The Computing Education Research Group has applied the lessons learned (particularly from the innovation website) to its current projects. A comprehensive description of these influences is out of scope here, but one example will suffice.

² <http://cerg.csse.monash.edu.au/evaluation/>

A new teaching repository, titled *PIAVEE* (Platform Independent Agent-based Virtual Educational Environment) is being developed. Key principles in the design of this system include:

- 1) The need for a thorough understanding of workflow issues on the user interface. Academics will not use new systems unless the learning curve is minimized, and the system provides sufficient intelligence to save the user much tedium.
- 2) The need for pedagogic technology to not impose particular models of use. Conventional proprietary learning management systems fail particularly here. We call this principle the ‘need for pedagogic agnosticism’.
- 3) The need for any teaching system in use by a range of students of varying abilities, backgrounds and cultures to provide a range of learning materials that are, and/or can be, adapted to suit the student’s learning needs.

Further details of the PIAVEE project can be found in Krishnaswamy et al, 2004.

Appendix 1: Project Brief

Learning Outcomes and Curriculum Development in Major Disciplines in Information and Communication Technology

- A1.1. Introduction
- A1.2. Background
- A1.3. Project Description
- A1.4. Selection criteria
- A1.5. Expressions of interest

A1.1 Introduction

In January 2000, the Minister for Education, Training and Youth Affairs established the Australian Universities Teaching Committee (AUTC), a national body aimed at improving Australian university teaching and learning. The AUTC will fund large projects aimed at significantly improving teaching and learning and is responsible for the Australian Awards for University Teaching.

The Committee's Terms of Reference are to:

- identify emerging issues in teaching and learning in Australian universities and propose strategies for dealing with these issues;
- identify and support effective methods of enhancing learning;
- encourage dissemination and adoption of these methods across the Australian university sector;
- promote collaboration and exchange of information in teaching and learning both nationally and internationally, and encourage and foster innovation in higher education teaching and learning; and
- manage the selection process for the Australian Awards for University Teaching.

The AUTC will commission in 2000 a small number of projects. Each project will be managed by a national steering committee that will meet regularly from the start of the study. The steering committee will consist of members of AUTC and domain experts with national and international standing in the areas.

The AUTC is now seeking expressions of interest in undertaking a set of projects focussing on issues of teaching and learning within representative disciplinary and cross-disciplinary areas.

The Committee is particularly interested in learning more about the varying ways in which issues of teaching and learning have been approached at the disciplinary level, in the context of such factors as:

- 1) the increasing role of the new technologies and of globalisation;
- 2) the changing nature of the student body and of student expectations; and
- 3) variations over time in graduate employment destinations and the requirements of employers.

These studies must produce an evaluative overview of courses in each of the areas with a focus on the specification and assessment of learning outcomes and must identify strategic directions for universities to enhance teaching and learning in these areas.

In seeking to identify examples of best practice in teaching and learning in Australian universities at the level of discipline or field of study, the AUTC is recognising the importance of the differing natures of the disciplines, and the ways in which effective innovation is frequently a response to the particular circumstances and pedagogical requirements that apply at the disciplinary level.

The AUTC has chosen to focus in the first instance on three major disciplinary and cross-disciplinary areas, namely Nursing, Communication and Information Technology, and Law.

A1.2 Background

In line with dramatic technological changes impacting on all areas of society, university courses associated with information and communication technology have diversified and expanded in recent years. Courses in Computer Science, Information Technology, Engineering and Business all aim towards preparing graduates who are able to move into various roles related to information and communication technologies. In spite of this diversification and expansion, there is a perception that courses in this field are not meeting the needs of industry. A survey conducted by the Information Technology and Telecommunications Skills Taskforce and released in September 1999 warned of significant shortages of skilled employees in this field over the coming years. One result of this shortage is that universities face difficulties in attracting academic staff in the field.

The IT&T Skills Institute is being established to work with industry and the education sectors to map out and plan for the needs of this dynamic industry. The Australian Universities Teaching Committee is calling for expressions of interest from institutions to carry out a major project in this important discipline area.

It is envisaged that the project would be completed in two main stages, each of one year's duration. Initially, funding will be guaranteed for the first stage of the project only. Funding for the second stage will be provisional and will depend on successful completion of the first stage and approval of a more detailed proposal for the second stage.

A1.3 Project Description

A1.3.1 Tasks

A1.3.1.1 Stage 1

Stage 1 of the project comprises a review whose purpose is to identify the extent to which innovations in teaching and learning and processes of curriculum development and review have been deployed in response to the needs of students and employers.

The project will describe and evaluate:

- national and international developments in teaching and learning in the discipline area;
- ways in which universities have assessed and responded to the changing nature of the industry and the changing nature of graduate employment in the industry;
- ways in which the processes of curriculum development and review have been varied and enhanced to take account of changing circumstances; and
- the role of professional experience and its management within the curriculum.

In addition the project will describe, evaluate and suggest changes for improvement related to:

- methods of assessing student and employer satisfaction, and the role such assessments play in curriculum review and enhancement of teaching and learning;
- relationships between course design and indicators such as enrolment and employment trends, graduate satisfaction and graduate employability;
- ways of incorporating strategies for the use of industry expertise in curriculum development and in the teaching and learning process; and strategies for the development of academic staff and for resolving academic staff shortages.

The project will produce a report on the above matters, and

- highlight examples of best practice in teaching and learning in the field of information and communication technology;
- make recommendations for the effective dissemination and take-up, as appropriate of these examples of best practice;
- place these examples of best practice in the context of an overall assessment of the quality of teaching and learning across the discipline; and
- outline a detailed proposal for completing stage 2 of the project.

A1.3.1.2 Stage 2

Stage 2 of the project should result in practical outcomes for students and university staff, as well as having an impact across the sector.

This stage of the project may include, but is not limited to:

- development of resource materials for use by staff and students;
- implementation and evaluation of innovative solutions to problems identified;
- preparation of case studies of innovative practice; and
- conduct of forums and workshops across the sector to raise awareness and enhance staff expertise.

A1.3.2 Duration

The project is to begin by November, 2000 (preferably earlier) and Stage One is to be completed by November 2001. The entire project is to be completed by November 2002. The timetable for the project must be submitted in the proposal but the actual timetable is subject to negotiation and agreement.

A1.3.3 Funding

This project will be funded through the Higher Education Innovation Programme (HEIP) which is a component of the Higher Education Funding Act 1988 (HEFA). Only institutions receiving an operating grant through HEFA, or incorporated bodies, are eligible to apply for an AUTC project grant. With the exception of incorporated bodies, grants provided through all components of HEIP are treated as increases to grants provided for operating purposes or limited operating purposes. At the time a grant is made through HEIP, the recipient will be informed of all conditions relating to the provision of the grant. Applicants should consult relevant sections of the DETYA website for further information about HEIP requirements.

A fully justified budget is required from each proposal. Stage 1 funding will be no more than \$200,000. Total funding for both stages of the project will be approximately \$300,000. Funding for Stage 2 will depend upon satisfactory completion of Stage 1 and the acceptance by the AUTC of a proposal for Stage 2.

A1.4 Selection criteria

Proposals will be assessed in terms of:

- demonstrated understanding of the issues involved in teaching and learning in the field of information and communication technology;
- capacities of the methodologies proposed to deliver appropriate outcomes;
- experience and demonstrated capabilities of the project team in relation to the tasks outlined; and value for money.

A1.5 Expressions of interest

Expressions of interest in the first instance are to be no more than 5 pages in length. More detailed proposals will be invited from those submissions which are short-listed by the AUTC.

The closing date for expressions of interest is the close of business on Monday 7 August 2000.

Expressions of interest should be marked AUTC Projects Expression of Interest and posted or couriered to:

Quality Location 123 Higher Education Division 16-18 Mort Street GPO Box 9880 Canberra ACT 2601

Further information can be obtained by contacting Professor Richard Johnstone, Deputy Chair of the AUTC on (02) 9514 1465 or Richard.Johnstone@uts.edu.au, or email autc@dest.gov.au

Appendix 2: Project Charter

A2.1 Purpose of this document

The purpose of this document is to describe the plan for the design and implementation of the ICT-ed project stage 2. The document details the project scope, tasks, resources and schedule for the project.

A2.2 Plan Description

In 2002, the project plans to disseminate information about innovations and best practice in teaching and learning ICT via

- Web based resources
- Series of participatory workshops to bring the project to ICT educators attention

A2.2.1 Background to the Project

Monash University is conducting a government funded national study into innovation in information and communication technology (ICT) education in Australian universities. The study called ICT-ed aimed to:

- Identified innovations in teaching and learning in ICT
- Explored ICT educators views on innovation
- Identified industry and graduate attitudes toward ICT education

In 2002, the project plans to disseminate information about innovations and best practice in teaching and learning ICT via

- Web based resources
- Series of participatory workshops

A2.2.2 Approach

The approach in stage 2 is to develop a web based teaching resource and to disseminate knowledge of the web site via

- facilitated workshops of some of the teaching innovations identified in stage 1
- face to face meetings with academics at conferences and through
- attending special interest groups

A2.3 Development Schedule

A2.3.1 Major End-Products

- 1) web based teaching resource
- 2) web based customisable student evaluation instrument (optional)
- 3) facilitated work shops showcasing innovative teaching materials

A2.3.2 Items

Components of the system to be developed are:

- database using Oracle or mySQL or PostgreSQL
- code in Java or php to drive the student evaluation material
- Dreamweaver templates to generate the html screens

A2.3.3 Dimensions

The system will reside on a unix server owned by CERG at Monash University.

A2.3.4 Security

The risks associated with the project are:

- web site is hacked
- Monash Internet portal is unavailable
- unauthorised or mischievous removal or modification of teaching resource

A2.3.5 Static or Dynamic

The web pages will be built dynamically from material contained on web.

A2.3.6 Major activities

The major activities during the project are:

- Determine stakeholder requirements
- Specify teaching resource
- program teaching resource website
 - build database
 - build search mechanism
 - build screen templates
- Design evaluation website
- Program evaluation website
- Prepare material for facilitated workshop
- Conduct facilitated workshops
- Measure effectiveness of project
- Report on project

A2.4 Significant external dependencies

The website continues to be hosted by CERG.

A2.5 Initial Funding

| Item | Budget |
|--|----------|
| Teacher / Curriculum developer (0.7 of SRF C4) | \$58,973 |
| Programmer (100 days @ \$210 per day) | \$21,000 |
| Clerical / Admin (02 Clerical) | \$6,640 |
| Travel, Facilities etc | \$13,000 |

A2.6 Resources

The primary resources required by the project are:

- Project manager / senior lecturer
- Programmer
- ICT-ed server
- Database
- Search engine

The prototype of the teaching resource screens can be found at <http://cerg.csse.monash.edu.au/icted/mockups/>³

The prototype of the evaluation site can be found at:

<http://www.csse.monash.edu.au/~smarkham/cerg/evaluation/>⁴

Schedule

Build database 1.5 days per table (person, review, project) + link tables

Design website look

Build screens 1 day per screen (home, login, view project, view review, input project, input review, search projects, browse projects, FAQ, detailed instructions)

³ <http://cerg.csse.monash.edu.au/icted/mockups/>

⁴ <http://www.csse.monash.edu.au/~smarkham/cerg/evaluation/>

Appendix 3: Issues from Stage 1

Stage 1 identified the following issues

- IT employers are satisfied with the quality of IT graduates, most respondents were employed in micro-businesses and unable to generate the work to employ additional staff. The businesses were too small to cope with the overhead of training up new graduates.
- Insufficient IT graduates were surveyed to draw any meaningful conclusions about modifying teaching to improve graduate satisfaction
- ICT educators were unfamiliar with evaluation techniques
- ICT educators were often unfamiliar with good teaching practices and innovative teaching practices. At the mini-conferences conducted in the initial stage many participants reported that they spent much of their time keeping up to date with advances in the ICT discipline so that they viewed their peer group as ICT professionals not as educators whose subject was ICT.

The major issues that this project attempts to address are

- Lack of social connectedness between ICT educators – often similar material is taught in different universities around Australia
- The people developing the curricula often don't get to meet their peers from other universities
- Lecturers reluctant to share
- Lack of resource
- Intellectual property
- Suspicion of colleagues tyranny of distance metro vs regional

Context of changes to university environment

- Increasing mass education and increasing government focus on vocational education
- Changing policy environment for the funding and governance of higher education
- Internationalisation and the advance of information and communication technologies

Changes to teaching context

- that towards flexible delivery, which in some manifestations includes a move towards student-centredness
- that towards quality assurance of higher education and the particular role of student evaluation of teaching questionnaires
- that towards the promotion of a scholarship of teaching and evaluation of educational innovations, such as practitioner-run and targeted forms of evaluation

A mini-conference format was developed to collect two three types of data:

- ICT educators' reported perceptions about factors to which educational innovations respond
- ICT educators' reported perceptions about the dissemination of innovation
- ICT educators' reported accounts of specific teaching and learning initiatives in which they are involved

Issues presented at the workshops included:

- What are the factors driving educational initiatives in ICT education?
- What are the factors inhibiting educational initiatives in ICT education?
- Please describe a teaching and learning initiative in which you or your department are currently involved. (included sub-prompts)
- Deciding whether your teaching initiative is effective. (included sub-prompts)
- What issues would be involved in disseminating your initiative to other ICT educators?

Factors driving innovation in ICT education

- personal initiative
- changing scale of teaching
- changing student population
- push for flexible delivery
- development of new content
- availability of new tools
- support from management
- limited academic freedom
- student demand

The motivation behind the initiatives were grouped into four broad categories:

- Student needs
- Student employability
- Pedagogical Concerns
- Resources

The foci of initiatives were grouped into ten categories:

- Skills
- Student-centred teaching
- Group work
- Assessment
- Certification
- Delivery modes
- Teaching tools
- Computer-mediated communication
- Collaboration
- Investigation

Appendix 4: Publications and References

The following publications are a direct result from the project.

- 1) Hurst, A. J., Lynch, J., and Collins, F., *The ICTEd Project Stage 1*, ISBN 0-9580945-0-0, also published at <http://cerg.csse.monash.edu.au/icted/ICTedStage1Final.pdf> ⁵2001.
- 2) Ellis, A., Markham, S., Munro, J. and Sheard, J., *Disseminating innovation and best practice in ICT education: the ICT-Ed database*, 19th Annual Conference of the Australasian Society for Computers in Learning in Tertiary Education (ASCILITE 2002), Auckland, New Zealand.
- 3) Hagan, D., *Employer Satisfaction with ICT Graduates*, Proceedings of 6th Australasian Computing Education Conference ACE2004, Dunedin, New Zealand, January 2004, pp. 119-124.
- 4) Hagan, D. and Markham, S., *Defining Innovation and Best Practice in Teaching*, Proceedings of IASTED International Conference on Computers and Advanced Technology in Education CATE2003, Rhodes, Greece, June - July 2003, pp.777-781.

The following paper is cited within this report, and is an indirect outcome of the project.

- 1) Krishnaswamy,S., Markham,S., Chhetri,M.B., Hurst,A.J., and Casey,D., *Pedagogical Views of a Virtual Educational System*, ICCE 2004: International Conference on Computers in Education, "Acquiring and Constructing Knowledge Through Human-Computer Interaction: Creating New Visions for the Future of Learning", RMIT University, Melbourne, Australia (2004).

The following works have been cited within this report:

- 1) Rogers, E. M., *Diffusion of innovations*, Free Press, New York. 1983
- 2) Couch, M. and McColl, M., *Rigour and collaboration in a qualitative inquiry: the strategic use of research methods in a national study of computer-based technology for students with disabilities*, in Paper presented at the 2001 Conference of the Association of Qualitative Research, Melbourne, 5-7 July 2001.
- 3) McInnis, C., *The work roles of academics in Australian universities*, Australian Government Publishing Service, Canberra [Available: http://www.detya.gov.au/archive/highered/eippubs/eip00_5/fullcopy.pdf ⁶].
- 4) Taylor, P. G., *Linking developmental-cycles to career progress: Recognising and rewarding ICT-enriched teaching*, in Paper presented at the 6th International ALT-C Conference, University of Bristol. 1999

⁵ <http://cerg.csse.monash.edu.au/icted/ICTedStage1Final.pdf>

⁶ http://www.detya.gov.au/archive/highered/eippubs/eip00_5/fullcopy.pdf