DISSEMINATING INNOVATION AND BEST PRACTICE IN ICT EDUCATION: THE ICT-ED DATABASE

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Abstract
Information and Communication Technology education is a diverse area that is subject to the pressures generated by the changing structure of Information Technology. A project funded by the Australian University Teaching Committee into the nature of innovation and best practice in ICT education found that the dissemination of ideas was an issue. A second stage of that project has responded to these points and built a Web database that provides an open, peer-reviewed context within which innovative educational activities can be presented to the wider ICT education community.

Background

The educational development activities reported in this paper are a consequence of the first stage of the *ICT-Ed* project (Hurst & Lynch, 2001) funded by the Australian Universities Teaching Committee to explore the extent of innovation and best practice in ICT education in Australian universities and the capacity of universities to respond to industry needs. Stage 1 of the *ICT-Ed* project was conducted in 2001 and was particularly concerned with how curriculum was being developed within an education best practice environment and how ICT educators were developing and embracing innovation. The background to this was a concern over the extent to which ICT education had an understanding of the needs of the ICT industry and how ICT educators were responding to those needs.

The results from Stage 1 found that the primary motivation to develop innovations for ICT education was that of the learning needs of the students. Also, a desire of educators to be better teachers prompted a drive towards establishing best practice along with such innovations. The results also showed that the achievement of such innovations and best practice raised some difficulties. First, educational innovation

and best practice is difficult to define across universities. The concept of what constitutes innovation is determined by the context within which the innovation is being viewed. What one educator describes as innovative may be determined as routine by another who has been exposed to a wider range of innovations in that field. Rogers (1983) points out that judgements about whether a particular idea is innovative 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" (p.11). While this is true for that individual, the educator must establish his / her credibility within the wider academic and educational community. This means that such innovations must be deemed innovative by peers and that credibility of claiming best practice needs to be established through appropriate evaluation.

This leads to the second difficulty; that an ICT educator is under pressure to establish his / her credibility in an environment that does not necessarily support educational activities. In the data collection for Stage 1, participants reported the lower status of teaching compared to research, the difficulty in getting recognition for the efforts expended in developing new teaching material, and promotion often tied to developing a research profile. As one participant in one of the data collection sessions said:

> ... getting a promotion it's still largely dependent on how many research papers you have pulled in, how many grants have been pulled in. Ok if you've taught and you've got good reports it will bring in something positive for you …

This suggests that ICT educators must take care in establishing that what they do is either innovative or best practice within the wider educational community if they are not to leave themselves open to the criticism of being engaged in trivial activities. Thus dissemination of innovation and best practice is crucial to ensuring that such initiatives are considered worthy of note, are demonstrated to be such, and can be used by the educator to, not only promote initiatives that assist students in their learning, but also promote the work of the educator in raising the status of these educational activities as a valid form of research and hence criteria for promotion.

The focus of this paper are the outcomes of Stage 1 of *Teaching ICT* that relate to the issues of dissemination of the educational materials generated by ICT educators. Eighty-seven examples of educational innovation, best practice or materials valued to be shared with others, as determined by the participants in the data collections process (Collins, Lynch and Markham, 2001), were used to establish educators' views on dissemination of innovation.

The findings from Stage 1 resulted in two distinct areas relating to dissemination. These were those issues surrounding the nature of ICT education and development of innovations and best practice that impact on dissemination, and the mechanisms of effective dissemination.
The issues covered such areas as:

- A lack of training in research design and educational evaluation methods
- A need to describe the innovation in discipline specific terms, thus limiting dissemination to the wider educational community
- A lack of awareness of what is innovative due to lack of exposure to ICT educational innovations and a lack of an identified ICT audience
- The low status of teaching when compared with research, particularly in relation to attracting ICT funding
- A higher valuing of technical discipline-specific research over research into teaching and learning
- The concern over intellectual property restricting dissemination
- The competitive rather than collegial nature of the now economically and commercially driven tertiary sector
- The lack of time to spend on the dissemination process. The currency issue of the ICT discipline dictates a faster development requirement hence time poor academics use what little time they have on development rather than dissemination

The mechanism for dissemination covered a range of approaches that included online dissemination (e.g. a web-site, email, listserves and online networking), face-to-face internal dissemination (e.g. collaborative teaching, discussion forums and seminars, clubs and professional development activities including formal

educational qualifications) and external dissemination through activities such as conferences, workshops, symposia and roadshows.

The results indicated a preference for interactive and informal channels with a need to discuss works-in-progress as well as disseminating the polished, finished product (Hurst and Lynch, 2001, Ch. 6.3). Given these results, a multifaceted approach was decided upon:

- A web site that contains a peer review database
- A web site based upon an interactive evaluation support system
- A series of workshops designed to encourage ICT educators to report on innovation and best practice and to establish the means of improving the evaluation of such initiatives that would increase the value placed on them

This paper will focus upon the peer review database web site.

Rationale for the Database

The decision to add another educational database to the Web was partly a function of the brief given for Stage 2 by the AUTC but it was also seen as an appropriate move with an ICT clientele in mind. At a practical level, the Web is a cost effective means of storing and retrieving information that allows for high levels of interactivity through online channels.

As given above, findings from Stage 1 influenced the philosophy for the development of this particular type of database. In particular, lack of resources was seen to hamper curriculum development activities. Related to this was the difficulty of finding out what educational activities were being implemented by others. Both of these were coupled with concern about the overarching problem of intellectual property rights.

Many ICT academics develop their professional networks via conference attendance, most of which is tied to the acceptance of refereed papers at conferences. Those interested in ICT education tend to find that the networks that are acceptable and influential in developing career paths do not include those involving educational theory and practice. This is a limiting factor in the effort many academics feel they can put into educational tasks, especially given the limited amount of time available to academics.

Various forms of database philosophy were considered within these constraints, but a background factor in much of the consideration was the use of peer review as the primary assessment and evaluation process. Resources often influence educational tasks and the *Teaching ICT* is no exception. The project team accepted that peer review was both an educationally more appropriate way of developing the database as well as being more viable in the longer term.

A key pedagogical input into the design of the database was the educational thinking that is defined as constructivism (eg von_Glaserfeld, 1998). That is, the approach to education that emphasises the importance of the learner constructing his/her own knowledge rather than passively receiving knowledge. Within the adult learning context, the work of Kolb (1984) and others on self-managed and discovery learning (eg. Cunningham, 1994) provide a clear pedagogical model. To this end the user of the teaching ICT database will be assumed to be taking responsibility for developing his/her skills and knowledge.

An additional component in the philosophy behind the design was to build a community of ICT educators who were collaborating to develop innovative or best practice teaching curriculum. As was said during the data collection:

> .. the way you disseminate or the way you learn about something else is by either knowledge or community..

Another made the point that:

> [you] just gradually network and find a community of users and build up that strength there.

One of the impacts of building such a community would be that ICT educators would be more likely to collaborate in the development of material if it could be properly attributed by people who adopted it. Peer review has long been recognised as the mechanism for establishing a research profile and recently researchers have reported their experiences of peer review to establish the scholarship of work in interactive media and the Australian Medical Journal (Taylor & Richardson, 2001).

The final position on the database was that it should reflect the ICT world and be a self-contained electronic resource that required minimal intervention from human beings. Consequently its characteristics are:

- Unrestrained submission from ICT educators
- Peer review by anyone purporting to be an educator
- Responsibility of the 'submitter' to monitor what is happening to his/her submission
- Responsibility of the 'submitter' to maintain or remove the submission

The model created here allows all participants to feel equal and able to contribute, particularly through the process of having self-nominated reviewers. Self-nomination of reviewers can be seen to reduce the risk of a panel of experts stifling an innovation. It was also important to establish responsibility on the part of reviewers through a reviewer being identified in the published reviews. Giving the submitter responsibility for removing an item reinforced this approach.

The database of teaching materials broadly follows Taylor & Richardson's (2001) model where a submission contains the teaching material or a link to a web site containing that material, the rationale for including this material, specification of limitations or restrictions on the material and discussion of outcomes of in-progress or completed evaluations. Each piece of material submitted would include:

- The reason it is seen to be innovative or best practice
- The purpose of the material
- Its educational intended outcomes
- The known limitations on its use
- The results of any evaluation that has been carried out

The Structure Of The Web Site

The IC-ed educational resources Web site was built around three areas of access:

- Entry of material by an ICT educator
- Review of the entered material by other ICT educators
- Search and retrieval of materials by interested parties

As was noted above, the database design is one of a self-maintaining environment. To this end, the database was designed with built-in automatic response mechanisms. When, for example, an entry had been reviewed the system would send an e-mail to the owner of the entry telling him/her that someone had reviewed that entry. The thinking on approaching this in this way was partly influenced by comments from ICT educators. For example:

> Dissemination itself achieves very little unless you're engaged with the information, how do you engage people with that information.

Development Process

The Web site was developed using a methodology that emphasised the importance of the user interface without compromising the integrity of the database structure. That is, an iterative procedure was established whereby the database structure and the user interface were continuously modified to produce an optimal beta system. There has been a great deal of criticism of web sites that fail to fulfill their intention. As noted by a participant in the Stage 1 data collection:

.. this almost totally entrenched belief in some people that you can do absolutely anything on the world wide web. If there's a problem all you have to do is put it on the web and it will be solved.

To initiate the development, the project steering group worked through various possible structures for the system. An initial set of options were developed and tested through field testing with possible users of the system. This stage focussed upon the nature of the interface and the assumed database structure. From the data that was collected, an initial specification was generated.

The next stage was a series of steps where the steering group evaluated possibilities as they were developed by the designer and programmer. During this stage an indirect conceptual cross-validation of the project's approach was carried out when the ICT-Ed system was compared with the design principles being used for the development of the Science Lecturership project (see http://www.webworkforce.org). Through a consultative process, the ICT-Ed system designer and members of the steering group were able to establish that the ICT-Ed conceptualisation was a radical departure from standard educational database thinking and that it did clearly fit within self-managed and constructivist thinking.

When the beta version of the system was finished, ICT-Ed Stage 1 participants were offered the opportunity of placing their material in the database.

System Evaluation Process

As was shown above, the system has been subjected to various forms of formative evaluation during the development phase as indicated in the field testing approach above. This has led to critical shifts in its structure and useability.

The system will be subjected to further evaluation as users come on-line. This will focus upon obtaining feedback from the various types of users – those who submit materials, those who submit reviews of materials and those who browse for material. The feedback will look at:

> The useability of the site
> The accessibility of the database
> The acceptance of the overall design philosophy

The Beta User Interface

At the time of preparation of this paper, the beta version of the system was fully functional. The system will be available at:

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

Entry Of Material
The screen controlling the entry of material was designed as far as possible to be transparent and to require minimal support screens. The opening elements of the entry screens are shown in Figure 1. It can be seen that the database asks for descriptive material and this allows for a richer information environment.

Figure 1 Project entry screen – first section

Review of Material

In keeping with the overall philosophy of the web site the review process was kept to a set of key issues. Figure 2 gives a segment from the early part of the review.

Browsing the Data Base

The basic browse sequence uses sufficient descriptors for the user to begin exploring the contents of the database. Figure 3 gives an indication of the structure available to the user.

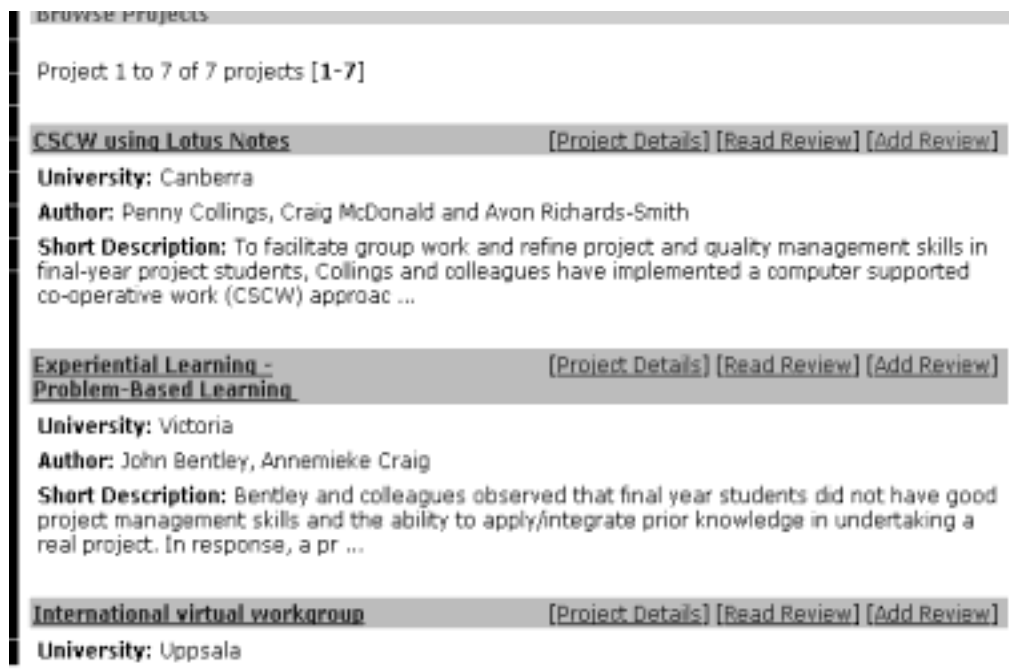*Figure 2 Segment of the peer review screens*

Figure 3 Segment of the screen from the browse link

Summary And Conclusions

The ICT-Ed project is the most comprehensive exploration of ICT education that has taken place in Australia. The outcomes from Stage 1 of the project highlighted an array of issues that face ICT education and the staff delivering courses. At the core of this was the status of educational practice within the academic environment where concerns that being an ICT educator can at times be seen as an inhibitor rather than as an enhancer of career development.

The design of an information repository was an obvious way to encourage ICT educators to get together in a low-level virtual environment to provide mutual support in what many saw as a relatively hostile environment. At the same time the project steering committee was well aware that there are many educational web sites that have very varying degrees of success in attracting interest and participation. For this reason, the ICT-Ed web site was designed in a way that tried to practice what it preached – the web site was about educators deciding what was innovation and best practice and not about telling people what they should be doing.

The material included on the web site forms the basis for lecturers working on similar material in different locations to collaborate in the further development of that material. Publishing teaching material in the public domain for peer review is a step towards establishing the validity of curriculum development as a field of scholarly endeavour. At one level it is providing staff with a means of cross-referencing their educational development tasks by reporting peer feedback. At another it makes public what best practice in teaching is all about. It can be hoped that this will be a step towards improving the status of teaching as an endeavour in its own right in the ICT area.

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