From the horse’s mouth: Factors inhibiting and driving innovation in ICT education

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Abstract

The ICT-Ed Project is one of a number of national DETYA-funded studies currently investigating educational innovations in the major disciplines at the university level. The ICT-Ed Project focuses on educational innovation in information and communication technology (ICT)—related disciplines, such as computer science, information systems and software engineering. As part of this study university teaching staff from relevant departments across Australia participated in mini-conferences where they discussed the factors driving and inhibiting educational initiatives in their disciplines. This paper reports the issues identified and discusses them with reference to national and international trends in university funding and governance. Broad issues described include policy and funding priorities, technological development, changing student populations and staff motivation. Although participants in the study were drawn from ICT-related departments, many of the issues described are relevant to university educators more generally.

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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. Later that year, the AUTC commissioned a first round of national projects on teaching and learning in particular discipline areas. Those areas were Law, Nursing and what was termed Information and Communication Technology (ICT). This year, further projects were commissioned in Arts, Biotechnology and Business. This paper reports on findings of the first stage of the project focusing on ICT education, a study that has become known as the ICT-Ed Project.

The ICT-Ed Project has three main stages, looking at the perceptions of educators, employers and students, respectively. This paper focuses on one element of the first stage, specifically, ICT educators’ views about the factors that variously drive or inhibit innovation in ICT education. A mini-conference format was designed to collect qualitative data from educators across the country. At each mini-conference, educators from relevant disciplines came together to discuss the factors driving and inhibiting educational innovation, the particular teaching and learning initiatives underway in their own departments, and the issues involved in disseminating educational innovations.

The data presented here is the result of axial coding of data transcriptions. The aim of coding was to build a coherent account of the many, multi-facetted issues that impact on the current teaching and learning environment in Australian university ICT-related departments. While many of the issues are equally relevant to other disciplines, some arise specifically or more acutely from the particular context of ICT education.

Before describing the study in more detail, the broader context of university teaching and learning is outlined with reference to recent government reports and subsequent research and academic discussions.

Broader Context of University Teaching and Learning

Over the last fifteen years, Australia’s universities have been subject to extensive and multi-facetted change. The pressures leading to this change are evidenced in and acknowledged by a series of Government reviews and reports (eg. Dawkins, 1988; Dawkins, 1989; Hoare, 1995; Vanstone, 1996; West, 1998). These changes include

1. Increasing mass education and increasing government focus on vocational education
2. The changing policy environment for the funding and governance of higher education
3. The advance of information and communication technologies

These pressures, resulting changes and their implications have been widely discussed and commented (eg. Bessant, 1996; Crittenden, 1999; Evans, 1997; Marginson, 1997; Marginson & Considine, 2000; Peters & Roberts, 1999; Smart, 1997; Symes, 1999; Wittrock, 1993) and will be described only briefly here.
Increasing mass education and increasing government focus on vocational education

Participation in higher education has been increasing since the post war era (figures can be found in Australian Bureau of Statistics, 1997; Australian Bureau of Statistics, 1999; Australian Bureau of Statistics, 2000; Everingham, 1999; Kemp, 2001). Policy documents have pointed variously to access and equity and to the health of the economy as rationales for this growth. Dawkins’ papers (1988; 1989) described a need for further growth, referring to an unmet demand for higher education, forecast growth in population numbers in the 17-19 year age group, increasing demands from older age groups, increased rates of school retention to Year 12, increasing demand for adult training, increasing demands of industry for higher education graduates, and increasing numbers of full-fee paying overseas students. This rationale has been criticised, with many commentators noting more pragmatic explanations:

In order to absorb greater and greater numbers of those school-leavers unable to find jobs in open employment, the university system was required to take more domestic entrants. Although this was couched in terms of a greater social commitment to the ‘clever country’ and improved ‘human capital’ for the workforce, time investment in apprenticeship training by government and industry fell at the same time, suggesting a more pragmatic explanation for the enrolment explosion. (Marginson & Considine, 2000, p.28)

The Green Paper proposed that, “Australia’s annual output of higher education graduates [be increased] from the [1988 levels] of about 88 000 to about 125 000 by the turn of the century” (Dawkins, 1989, p.13). This target was reached in 1993 (Kemp, 1998). By 1998, 671 853 students were attending Australia’s publicly-funded universities (Kemp, 2001).

Bessant (1996) argued that the increasing numbers of enrolments, together with the need to compete with resources led to “an over-stressed system at all levels” (Online Document). Marginson and Considine explained that, "New entrants were simply allowed to flow into existing courses and institutions with little attention to career options or ways to mark out a new pathway for less academically formed students" (Marginson & Considine, 2000, p.29).

Coupled with the increasing numbers of places in higher education is an increasing government focus on vocational education. Dawkins’ Green and White Papers (1988; 1989) are generally regarded as a turning point that crystallised movements towards the privileging of the economic value of education over other types of value. The focus on economic value is a challenge to the traditional values of universities and raises question about what purpose(s) higher education should serve. Marginson and Considine (2000) remind us that, as early as the Martin Report (1964), skill and professional development were described as a national resource “to be developed and exploited like any other” (p.23). The Labor Government’s focus on “human capital” and the economic value of education came to the fore with Dawkins’ papers. Bessant (1996) noted that by the late 1980s, the Labor Government had placed the education system at the centre of economic reform.

More recently, the economic advantage to be gained from education has been foregrounded not only in terms of advantages to Australian society but also in terms of individual gain (Crittenden, 1999). While the seeds of this change of focus can be seen in Dawkins’ papers, particularly in the introduction of the Higher Education Contribution Scheme (HECS), it is more clearly evident in the Howard Liberal Government’s Higher Education Budget Statement 1996 (Vanstone, 1996) in statements such as, “current funding arrangements do not provide a fair balance between the public and private benefits derived from higher education” (Online document) and in legislation that allowed for Australian students to pay full-fees for university courses.
Symes (1999) described this focus on the economic value of university education, both for the wider economy and for individuals, and the subsequent changes in the focus of teaching and learning and in the marketing of education, as the vocationalisation of the university, in which “the dominant imperative is learning for employment” (p.241). Employers or industry groups are seen as stakeholders in education, and industry needs are seen as the key driver of students’ needs as future job seekers.

**The changing policy environment for the funding and governance of higher education**

The policy environment that supports the funding and governance of universities in Australia has been subject to dramatic change over the last fourteen years. The Labour Government reforms of the late 1980’s led to the formation of thirty-six large universities from the numerous higher education institutions that had previously existed. This rationalisation of the higher education sector was accompanied by cuts to government funding and a need for universities to compete for this funding, the introduction of student co-payments (HECS) and the introduction of formulae and targets that allowed for more centralised control of universities. These changes have been described as the corporatisation of universities. Marginson and Considine (2000) wrote:

> Universities are no longer governed by legislation: they are more commonly ruled by formulae, incentives, targets and plans. These mechanisms are more amenable to executive-led re-engineering than are the deliberations of a council or an academic board, and less accessible to counter-strategies of resistance. They also fit with management-controlled tools such as soft money budgets, commercial companies, temporary institutes for research or teaching, fund-raising and marketing campaigns, all drawn together in a complex web of accountability tied only to the senior executive office. (2000, p.10)

The competition that was encouraged between universities, for funding and for students, was meant to improve their responsiveness to the needs of the workplace and to enhance productivity and quality (Marginson & Considine, 2000). Competition for funding has been facilitated by increasing demands for accountability and quality reporting. These changes have been seen by many as challenges to traditions of collegiality, institutional autonomy and academic freedom (Bessant, 1996, Online Document). Marginson and Considine (2000) wrote, "The modernisation of management and the extension of economic responsiveness seem inextricably linked to the faltering of academic identity, to reliance on money as the meta-measure of value, and a corrosive cynicism about individual motives and social purposes" (p.14).

The Vanstone budget statement (Vanstone, 1996) coupled with the West Report (West, 1998) applied further pressure on the administrations of universities to focus on competitiveness with each other and internationally, for students and for funding. Peters (1999) wrote that, "Contemporary universities function as performance-oriented, heavily bureaucratic, entrepreneurial organisations committed to a narrow conception of excellence generated by the imperative of international competitiveness" (p.47). Descriptions such as this are indicative of the way many academics have interpreted the changes: with a degree of cynicism. This cynicism can be best understood by exploring how the changes challenge traditional conceptions of the university and the traditional roles and motivations of academics.
The advance of information and communication technologies

Another factor in the broader context of university education is the rapid advance and convergence of information and communication technologies. The convergence of these technologies is facilitating greater accessibility and greater flexibility. Increasingly, Internet-based technologies are seen as the basis to solutions to many of the problems faced by university educators, including increasing student numbers and student demands for more flexible delivery. These technologies have also assisted universities in increasing their target markets to include students who do not attend physical campuses, including students in other countries. This has been a key factor in the approach that many universities have taken to the increasing need to be more market-oriented and more entrepreneurial. Evans (1997) commented that,

> It is now difficult to encounter a university that does not ‘sell’ itself in its publicity materials partly on the basis of its use of new educational technologies … and which is not seeking to reform its teaching using these technologies. (p.15)

New electronic information and communication technologies play two main roles in the broader context of university education: (1) They provide universities with a focus for advances in teaching and learning that can be used as selling points in their marketing, and (2) they promise a means of responding to the problems emerging from this new environment, such as very large numbers of students.

Both these roles are linked to the internationalisation of education. The use of new technologies is a means of attracting students from new markets and they also facilitate the delivery of educational services to off-shore fee-paying students. However, increasing internationalisation is not only an increase in the amount of international teaching; numbers of international students attending universities in Australia have also increased. Coupled with advances in and the diffusion of information and communication technologies are other globalising forces such as the development of transport technologies and the development of legislation to better facilitate the movement of people across borders for the purpose of education. As a result of university marketing and enabling legislation, increasing numbers of fee-paying international students are studying in Australia.

Some have been critical of universities money-raising approach to internationalisation. Bessant (1996) wrote,

> University marketing has been directed towards attracting fee-paying overseas students as well as the sale of consulting and technical services. Some universities have been very successful in these ventures, but have also come to rely heavily on the finance this brings. However, there is very little evidence that programs have been tailored to meet the needs of these overseas students, apart from special English language courses. They are seen as the cream on the ice-cream bringing in desperately needed finance. (Online Document)

This criticism is borne out in the difficulties so often reported by teachers of international students.

However, others have argued that the use of information and communication technologies to facilitate the remote delivery of educational services has led to a renewed focus on teaching and learning techniques and on the needs of students. Evans (1997) wrote,
... traditional forms of education are focused around teaching opportunities through, for example, lectures, tutorials and practicals. Open and distance education, on the other hand, is focused more on facilitating opportunities for learning. (p.49)

Crittenden (1999) has also noted the attention being given to how to teach and learn using new technologies. However, he is critical of this *preoccupation* because it detracts from more important questions about the role of universities and the purpose of higher education.

The role of new technologies in the broad context of university education is complex. New technologies are often seen as both the cause of and the solution to problems. They offer a means of providing educational services and products to larger bodies of students, in a more diverse range of circumstances, regardless of the time/place needs of the students. They are also offered as a solution to problems associated with large diverse bodies of students. There are many reasons why the use of new technologies in education, and associated increases in the internationalisation of university education, receive lukewarm responses. One reason that links the three areas of change outlined here is criticism of the perceived motivations behind the changes. When viewed as part of the larger context of university education, the educational value of using new technologies appears to be secondary to other motivations.

Methodology

The broad aim of the research reported here was to investigate the ways in which ICT educators are approaching issues of teaching and learning. Two types of data were sought: (1) educators’ perceptions of the issues currently surrounding educational innovation and (2) descriptions of particular teaching and learning initiatives that are currently being planned, implemented and/or evaluated. In both cases, the data collected was qualitative. A mini-conference format was devised to facilitate the discussion of issues and the description of initiatives. In this section, we describe the mini-conference format, the participants and the techniques used to analyse and present the data.

*Mini-conference format*

The mini-conferences ran from 10am to 4pm on designated days in each capital city. Two mini-conferences were held in Melbourne and in Sydney. One mini-conference was held in each of Hobart, Brisbane, Adelaide, Perth and Canberra. A video-link was used to conduct an abridged version of the mini-conference with educators in the Northern Territory. The number of participants in each mini-conference ranged from four to fourteen. Numbers were kept small to facilitate discussion and so that participants’ presentations would fit into the time allocated. A workbook was used to structure the proceedings of each mini-conference. Two researchers directed the proceedings.

*The workbooks*

Workbooks were provided to each participant on their arrival at a mini-conference. The workbooks provided

1. a structure for the mini-conferences
2. participants with somewhere to make notes in preparation for their contributions to the mini-conferences and about the contributions of others
3. participants with a record of their participation and of notes taken
4. the researchers with a record of notes made by participants
5. researchers with outline information about the teaching and learning initiatives reported

The workbooks contained a description of the study, an informed consent form, spaces for participants to make notes and five stimuli items:

1. What are the factors driving educational initiatives in ICT education?
2. What are the factors inhibiting educational initiatives in ICT education?
3. Please describe a teaching and learning initiative in which you or your department are currently involved.
4. Deciding whether your teaching initiative is effective.
5. What issues would be involved in disseminating your initiative to other ICT educators?

Questions 1, 2 and 5 were used to stimulate discussion among participants. For each question, participants were given five minutes to think about and make notes about the question before they were prompted to discuss the issues involved. As issues were raised and discussed, one of the researchers recorded the issues on a whiteboard. At times, the researchers asked for issues to be clarified. Questions 3 and 4, along with accompanying sub-prompts, were used to stimulate participants to prepare for presentations to the group. Only data collected in response to questions 1 and 2 are presented in this paper. Data collected in response to question 5 has been presented elsewhere (Collins & Lynch, in press). Data on particular teaching and learning initiatives will be presented in subsequent publications.

Data collection

Data sources included

1. Transcribed audio-recordings of discussions
2. Transcribed workbook entries for each participant
3. Whiteboard printouts and transcriptions

Mini-conferences were also video-recorded. However, these recordings were used only to track lines of argument when voices were difficult to distinguish on the audio-recordings rather than being a data source in their own right. Photos were taken during the mini-conferences for use on the project’s website and on promotional material.

Participants

To recruit ICT educators to the mini-conference program, invitations were sent to all heads of Australian university departments, schools and divisions where ICT-related courses are offered. These included departments of information systems, software engineering and computer science, for example. Invitations described the target group as staff teaching in ICT-related areas who are involved in teaching and learning initiatives that aim to improve ICT education. Department heads were encouraged to circulate invitations to relevant staff members. In total 82 ICT educators from 51 administrative units (46 departments/schools, 1 faculty, 4 university level education units) in 29 universities (27 public, 2 private) participated in the mini-conference program. Participants included staff members from a range of academic levels, including all levels of lecturer, department heads, professors, associate and faculty deans, one pro-vice chancellor and a small number of instructional designers.

For a number of reasons, we have described the participants as a group of ICT educators who are specifically interested in teaching and learning. First, the invitation to participate
described the target group as staff members who are involved in teaching and learning initiatives that aim to improve ICT education. Second, participants self-selected into the study knowing that it focused on teaching and learning. Finally, the nature of participants’ contributions indicated that they were not only interested in teaching and learning, but were enthusiastic about and committed to improving teaching and learning in their disciplines. Therefore, participants are not a representative sample of ICT educators, but rather those ICT educators who were both interested in participating in a study with an education focus and able to attend on one of the days offered.

When informally asked why they attended, participants generally gave reasons such as, "to find out what other people were doing." When asked what they had gained from participating, two benefits were frequently given: an opportunity to hear about what was going on in other institutions and an opportunity to reflect on and receive feedback about their own practice. An interesting observation about the participants is that the majority were from institutions that, prior to the introduction of the unified national system, were predominantly colleges or institutes of advanced education, that is, institutions where teaching was the primary activity. This bias helps us to describe the participants and it has implications for the results reported below.

Analysis

QSR NUD*IST VIVO (1999) was used to assist in the systematic coding of the data collected on factors driving and inhibiting innovation in ICT education. The aim the coding process was to reduce the data, so an intelligible account of the data could be produced (Dey, 1993). To begin with, a data-up, rather than theory-down, approach was taken to the analysis. For questions 1 and 2, notes made in participants' workbooks and whiteboard records of discussions were coded into a large number of emerging categories. These categories were then represented visually in rich pictures (Patching, 1990) which served as tools to group categories and therefore to reduce the data further.

Final categories contained transcript excerpts of comments and discussions about the factors that most immediately applied pressure to ICT educators, such as the changing scale of teaching. Other, more remote factors that were described as causes or sources of more immediate factors were subsumed into categories reflecting the more immediate factors. For example, government and university level policies were often discussed as the source of particular pressures. The policy environment does not feature as a factor in our categories, but the resulting pressures, such as the changing scale of teaching, do. This distinction was made because of the large degree of interrelatedness between reported factors. The broader contextual factor of Government policy was discussed in relation to many of the more immediate factors that were described.

The final categories were then tested against transcriptions of audio-recordings of discussions, using the constant comparative method recommended by Silverman (2000). The small number of categories allowed for the complexity of particular issues/factors to be captured in each category and examined. The inclusion criterion for coding an excerpt into a particular category was that it referred to or described the factor that the category named regardless of the specificity of the excerpt. Particularly rich excerpts were coded into multiple categories. To increase the reliability of this coding process, a co-researcher inspected reports of each code for consistency.

The University Teaching Environment

This section presents results from the analysis of the mini-conference discussion and workbook transcriptions pertaining to questions 1 and 2 on factors driving and inhibiting
innovation in ICT education. It includes descriptions of factors noted by participants as driving and/or inhibiting innovation. Many factors discussed were described as both driving and inhibiting innovation. That is, they might drive some types of educational initiatives while inhibiting others.

Factors reported by participants to be driving and/or inhibiting innovation in ICT education can be grouped into nine main categories: 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 and student demand. Each of these categories is described below, with reference to illustrative transcript excerpts.

*Individual initiative*

*Individual initiative* refers to factors that, although linked to other external factors, were described by participants as originating within individual ICT educators themselves. It includes references to individual educators’ desire to be better teachers and their desire to be seen to be at the forefront in their fields. One participant said, "There’s also enthusiasm and a desire to be a better teacher and help your students to learn better" (mini-conference (M-C) transcript). This comment is typical of those comments referring to the initiative of individual ICT educators.

The desire to be a better teacher was described as driving responses to observed problems. Some problems discussed in this context were first year transition problems, student dis/satisfaction, plagiarism, equity and access issues and unsatisfactory learning outcomes. Unsatisfactory learning outcomes included the failure of students’ skills to meet the needs of industry. Both student dissatisfaction and first year transition problems were discussed in terms of the changing student population and the changing scale of teaching. As one participant explained,

... there’s a sort of positive and negative reasons for [teaching and learning initiatives], so you know, you get enthusiasm in an individual saying, ‘alright I want to do this because it’s a good idea and it will promote better teaching blah, blah, blah’, versus ‘well here’s a way of coping with this appalling problem we’ve got, let’s do this‘." (M-C transcript)

The *individual initiative* category also includes contributions about individual ICT educators’ decisions not to pursue an innovation due to the professional and personal risks involved in trying something new. Discussions about these risks included references to lack of support from management, and lack of reward and recognitions for efforts. Concerns about intellectual property were also discussed as potentially contributing to an individual educator’s decision not to pursue an educational initiative. The following mini-conference excerpts illustrate the types of concerns that participants had when describing individual initiative as an inhibiting factor:

Participant: Another factor is the amount of risk that an individual might be prepared to take, I think to show initiative you have to be a risk taker and I think a lot of academics might not be risk takers and there might be a few reasons for that one, they're just, that's not the type of individual they are and a measure of performance I was told to be promoted just based on teaching can't just be a good teacher you have to be an outstanding teacher, I don’t see those requirements placed on the research emphasis, so you know, if you want to put under risk, you have to be a risk taker and not all academics are risk takers. [Moderator:] So riskiness is an inhibiting factor. The riskiness
of actually trying something new when it just may not be valued?
Participant: Yeah that's right.
[Moderator:] You're trying something that hasn't been?
Participant: And it will affect your reputation for life so if it goes badly you
have got this black star against your name and nobody will want to do
anything with you but [if] it goes well, well you could be an international
superstar, who knows. (M-C transcript excerpt)

Participant: I think one inhibiting factor is uncertainty about the educational
efficacy of this stuff and a lack of research findings so people say ...
Participant two: Saying it works.
Participant one: Well you can't prove it works so I'd rather you didn't do it. (M-
C transcript excerpt)

Participants generally agreed that, despite often being in an environment that was not
supportive of innovation, individual educators continued to develop teaching and learning
initiatives both as mechanisms for surviving changing conditions and as a means to satisfy
their own desires to "be a better teacher".

Changing scale of teaching

Participants consistently cited changes in the scale of teaching both as a driving and an
inhibiting factor, referring to increasingly larger class sizes and fewer contact hours. Larger
scale teaching was described as causing particular problems, thus driving particular
innovations, while the teaching and learning environment of larger scale teaching was
described as inhibiting some types of teaching and learning activities. The following excerpt
describes the changing scale of teaching in negative terms, as a problem that needs to
besurvived:

I think number one is the size of our student body and how are we going to
survive with, you know, we used to have classes of one hundred, big ones
were two hundred and now our big ones are a thousand and we don’t seem
to have any more money, we don’t have teaching assistants for PhD students
’cause nobody does a PhD in Computing any more and so we have unskilled
tutors and we just need strategies to survive. (M-C transcript)

Changes in the scale of teaching were linked to Government and university level policies
and pushes to save money. They were discussed in relation to increasing staff workloads,
first year transition problems and problems arising from the increasing diversity of students.
Although, generally critical of pushes for flexible delivery through the use of Internet-based
technologies, new modes of delivery were acknowledged as the most obvious way to deal
with the larger student numbers. However, many participants had reservations about more
flexible modes because, although they are an obvious response to larger student numbers,
they did not see them as solutions to problems caused by these large numbers.

Changing student population

Changes noted in the student population include the more diverse language and educational
background of students, the more diverse experience and skills of students and more
diverse student circumstances. The increase in diversity of language and educational
background of students was linked to the growing number of International Students and to
Government and university level policies on enterprise funding and fee paying. Increased
diversity in the range of students’ experience and skills was linked to an increase in the
number of enrolments and discussed in terms of Government policies for more vocational
education and for greater access to higher education. That is, the greater diversity in students was seen as a result of greater student numbers. The following mini-conference excerpts illustrate the types of concerns that participants have about the diverse range of educational backgrounds, skills and experience of students.

Participant: I think linked to that is a more diverse student population than the universities have had in the past.
<general agreement> ...
Participant: Yes and accommodating a wider range of abilities in the one class. (M-C transcription excerpt)

Participant: Yeah we’ll get secondary school students doing tertiary level units.
Participant two: Yeah. Yeah.
Participant one: But you still get people coming into computing degrees who haven’t used computers.
Participant two: That’s right.
Participant three: Yeah that’s right.
Participant one: You’ve got someone who’s [a] Cisco qualified engineer and the person who’s never used a computer in the same class.
Participant two: That’s right.
Participant one: And you have to --
Participant two: Yeah first year is a nightmare, there’s no two ways about it.
Participant one: And you have to keep them happy. (M-C transcription excerpt)

The fact that computers are so ubiquitous now means that some of our first year students have been doing computer programming for ten years and they’re good at it indeed, whereas others don’t know where the enter key is and that’s, that is a real problem. How do we amuse the experts or give them, add some value to their education in first year? (M-C transcription excerpt)

While increasing student numbers is a feature of other discipline areas, participants argued that it was a particularly acute problem in ICT education because of both the increasing demand for ICT graduates and the increasing demand from employers for ICT literate graduates and the resulting growth in the need for graduates from a wide range of disciplines to have some ICT education.

Students were also described as having more diverse circumstances in terms of time fraction, workforce commitments, family commitments and faculty of enrolment. For example, in the following excerpt, a participant explains that the amount of time students spend in paid work has increased.

Participant: One thing we’ve really noticed with our students is the need for them to work more, so they spend a lot more time working as supposedly part time and trying to do a full load and therefore we have to be more flexible in letting them pick what subjects will fit in.
Moderator: You mean work for money not academic work?
Participant: Yes, yes absolutely.
Second participant: Yes.
First participant: And that’s really changed over the last ten or fifteen years. (M-C transcript)
Participants then described the implications of the diversity among students’ circumstances. In particular they referred to these students “wanting to operate in that flexible manner” and a growing demand for “time/place independent learning” (M-C transcript excerpt).

As with the scale of teaching, the growing diversity of the student population was noted both to inhibit and to drive innovation, particularly diversity in ability and skills at first year.

**Push for flexible delivery**

Participants reported being under pressure to move towards more flexible delivery of courses. This factor was linked to other factors in complex ways. It was discussed in relation to the increasing scale of teaching, money saving, the availability of new tools, the "Internationalisation" of higher education, growing competition between universities, student needs/demands and fashion. In the following excerpt, a participant describes the relationship between increasing diversity in students’ circumstances, student demand and flexible delivery of education.

I think another thing is, with regard to the student base, I can’t remember the exact numbers but I know [my university’s] intake of students that are sort of part-time or are working is getting higher and higher  
<general agreement>
And the students do want to operate in that flexible manner and that is sort of pushing the university to go for this flexible learning avenue, so we’re having, you’ve got to pull out the figures but I don’t think our classroom numbers are going down, but our numbers where students want to study in their own time and their own place at their own convenience is going up and that might include yeah, new mothers, it might include people who are working part-time, working full-time and want to do the courses outside of hours and so I think there’s that you know population mix has changed. (Mini-conference transcript, Melbourne 1)

Participants were aware of both Government and university level encouragement of the flexible delivery of programs. Despite recognising potential advantages of flexible modes, participants were generally critical and even cynical when discussing the policy environment surrounding pushes for flexible delivery. This cynicism seems to arise from participants’ perceptions of poorly justified university level initiatives, particularly when initiatives are seen to be motivated by money saving and revenue raising, rather than by educational aims. Participants also described misunderstandings at the university administration level about the educational advantages and disadvantages of flexible delivery and about effects on teaching staff members’ workload and work practices. Comments containing implicit criticism of university level pushes for flexible delivery include:

… our university would see something that’s effective as something that fits into their teaching and learning plan which is ‘lets make learning flexible’. ‘Oh look, this makes learning flexible: that’s effective.’ (M-C transcript excerpt)

Participant: What was the one that came after changing student populations?  
Participant two: Larger classes and --  
Participant three: Workloads.  
Participant one: Yeah higher workloads.  
Participant three: That inhibits it doesn’t it?  
Participant one: Well both.  
Participant four: No that’s why I say, "Oh we’ll just put it all on the web," and you don’t have a class. (M-C transcript excerpt)
You got to admit, I mean half the people in management they just, you know, every, "You can do anything on the web now." "We must have it on the web". (M-C transcript excerpt)

Participant: Now separately but aligned with this question about not understanding what is possible 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. Participant two: Internet boosting. Participant one: Yeah Internet hype. (M-C transcription excerpt)

At the high levels I think their beliefs are not necessarily founded [in] research about costs and about learning and about the quality of learning. (M-C transcription excerpt)

Participants also discussed risks related to flexible delivery. They expressed concerns about lack of evaluation or pedagogical framework, the increased likelihood of problems such as plagiarism, investing time in initiatives that are "faddish" or that suit marketing purposes rather than educational purposes, about student access and reliance on inadequate or unreliable technology.

Development of new content

Participants described a constant need to develop new course material. Participants supposed that this need is more acute in ICT education than in many other disciplines because of the rapid development of information and communication technologies. They discussed this need in terms of demands from students to learn about the latest technologies and the changing needs of employers and of students as future employees. The following excerpts illustrate participants’ perceptions of the role of employer needs in content development.

I think the work place and corporation determine to a large extent what sort of student population we have to strive to produce. (M-C transcription excerpt)

Participant: I think [employers’ needs have] a bigger impact on our area than it might have on Philosophy or History or any of those areas Participant two: Yeah a five-year old text book is pretty useless. (M-C transcription excerpt)

Participant: One of our drivers is the fact that we have a one year Grad Dip Program and those people come in with no background in computing whatsoever, perhaps no mathematics, and they’re going to be employed a year later and we haven’t got time. We’re very much industry driven. Participant two: I think we have to resist -- Participant one: Well they’re our customers and our clients and that’s the service we’re providing, a crash education, crash training. (M-C transcription excerpt)

One factor that just came up to my mind, the fact that the students are going to be life long learners. I mean they’re not going to finish their schooling here, they’re going to go into industry, five years from now they’re going to retrain or whatever … It’s much more important to learn how to learn than to actually learn a particular language which we are teaching now which is going to be obsolete anyway. (M-C transcription excerpt)
Participants described some employer and student demands for content as a demand for the latest fad. They also discussed a conflict between their own desire to teach general "the fundamentals" and students' desires to learn the latest programming languages, describing students' misconception about what degrees in ICT are all about. Specific skill requirements in newspaper job advertisements, such as requirements that applicants have experience in particular versions of particular programming languages, were seen to add to these misconceptions.

There’s a bit of a conflict between teaching basic principles and teaching the latest stuff and the latest skills, and this is to do with student motivation and employer demands, and it’s to do with a certain degree of ignorance about what’s important, and I think there are real issues here and I, as I say, I don’t know whether they belong in [question] one or two but it sort of applies to a lot of what we’re saying. Would the students be better off if they had less of learning the latest skills of the, that are very specific, that are going to change next year, and learning more general principles or are there no general principles any more? Are things changing so fundamentally? I think this is a problem some people have and it distracts them a bit from building up wonderful ways of teaching cause they’re still thinking what the hell should I be teaching. (M-C transcription excerpt)

There was not consensus among participants about the role of university education and the relative importance of the latest skills versus general principles. Many preferred to differentiate between education and training, seeing up-to-the-minute training as the role of the Vocational Education and Training sector or of employers themselves, and arguing that university education was about the production of "IT professionals".

Linked to discussions of content and debates about current skills vs. general principles was discussions of graduate attributes, such as effective communication skills. An increasing focus at the university level on graduate attributes was seen as a response to employers’ needs for more well-rounded graduates.

One of them is the one you’ve just mentioned about the diversity of students. Another one is, in particular in the software industry, it is the fact that in the software industry people are working in teams and talking about software development. The days in which somebody was sitting down, down in the garage and developing something is really over, and I think these two are actually pushing us to teach in teams because teaching in teams, or learning in teams actually is one way of solving, partially at least, the diversity. ... [moderator:] Okay so that’s put into the category of the needs of industry? The changing needs of industry? Both industry and of students. ... And allied to that as well is the kind of area that we’re in there’s a predominant push for the sort of the vocational side of education rather than what I would call the academic side." (M-C transcription excerpt)

Graduate attributes were described as a new area of content and were also seen as encouraging new ways of teaching. For example, it was seen as appropriate to use team-based learning to teach skills in team work.

The need to develop new content was generally seen as driven by a combination of changing industry needs and the development of new technology. The development of new content was characterised by the tension between the short-term and long-term needs of
students. Discussions about this tension often raised questions about the role of universities and the purpose of university education.

**Availability of new tools**

As with the development of new content, the availability of new tools was linked to the rapid development of new technologies, particularly the Internet and related tools. These tools were described as "enabling technology" and many participants described how the increasing accessibility of electronic information and communication technologies has allowed them to develop more interactive and more responsive learning environments.

However, not all discussions of these new technologies were positive. Educational fashions, commercial suppliers of tools and university policies were also described as driving educators up-take of new tools. In particular, participants discussed the role of commercial courseware, such as WebCT™, and university level decisions to promote and support particular courseware products. In discussions, these forces were often described as distracting from the development of effective teaching practices and learning materials. These discussions echoed and often overlapped those specifically dealing with "the push for flexible delivery", with this push being seen as a particular instance of education’s infatuation with the latest educational tools. The following excerpt is an example of participants’ concern about universities’ responses to the development of new tools.

I think technology also has a lot to do with education initiatives and quite often when a new technology arises it’s grabbed by the university as being an educational innovation without any considered thought as to the genuine educational value of the technology, so that often the technology itself becomes a marvellous PR exercise for government, for universities and actually has little to do with genuine education. (M-C transcription excerpt)

Participants were also concerned about students' access to technology and about the risks involved in using unreliable or inadequate technologies. The following excerpts illustrate participants’ frustration due to the rapid development of new tools.

Participant: On the technology side I’d say the Internet bandwidth is still an issue … Internet bandwidth, it’s not so much what in theory is there, it’s what's in practice.
Participant two: Yeah.
Participant one: It’s about trying to down load videos on it.
Participant three: And access too. (M-C transcription excerpt)

Even more basic than that is when you have electronic submission of assignments and you get some kid who’s still got Microsoft Works on their computer and you look at this thing and say what am I going to do with it. Or the ones who send in the ones that are even more advanced than what you’ve got.

Yes. <laughter>

Yes and you’re using the university’s computers. (M-C transcription excerpt)

Participant: I mean all of us are computer-conferencing, I teach an MBA unit and I never see any of the students, um not at all, it’s all done by e-mail, there’s no lectures, there’s two assignments and that’s about.
Moderator: You never see the students?
Participant: No.
Participant two: So who are you teaching? Don’t know? Who gets the
qualification at the end? They guy with the name or the guy who paid him to do it?

Support from management

Support from management was described as enabling or driving innovation. Lack of support from management was seen to inhibit innovation. Support was described in terms of resources (funding, time, human resources), reward and recognition for efforts and the presence of senior champions. The following excerpts are representative of the comments participants made about how they experienced lack of support from management.

You really need to have management support, I mean as an educator you would like to see that there is a plan at the university, at a high level, with some goals and some strategy or whatever and some really, some public recognition. … you would like to know that in the promotion process … education, or whatever, is equivalent to any other avenues that you have for promotion forces, and I know everybody’s smiling because sometimes you have this in writing, or even in, but it doesn’t work. (M-C transcription excerpt)

They have to put some kind of support, what I mean by support for example, is a lab to experiment or with time, that is if I would like to explore some kind of new technique in teaching I would like to teach less for that particular semester because I want to have time to do that, that’s management support. (M-C transcription excerpt)

Participant: No bloody money.
Participant two: Reduced funding.
Participant three: Not enough funds.
Participant ?: Mm.
Participant ?: Along with no support to learn all these new technologies, you’ve got to do it all yourself.
Participant ?: Yes that’s, that was resourcing.
Participant ?: But the resources are equipment and sort of development time aren’t they?
Participant ?: Resources, yeah there’s no need and time for training. (M-C transcription excerpt)

Lack of champions of change too, put it under uni attitudes, champions cause you need those, this sort of stuff, you need someone that’s going to stick their neck out and say no it will take a few years to sort it out. (M-C transcription excerpt)

ICT educators’ lack of pedagogical knowledge was also described as evidence of lack of support from university management. The pursuit of educational training was generally not seen to be encouraged and participants’ workloads did not allow for professional development in this area. Participants consistently described management as not valuing teaching as highly as research. Participants complained that, although management said that excellence in teaching would be rewarded, this was not the case.

Participant: Traditional university attitudes to teaching, I mean this is, we’ve merged from a CAE with a traditional university … and it’s like there are several people, lots of people they’re not sort of from [the original university campus] who I mean, teaching you know, you get up you give your lecture and then you go and that’s it.
Participant two: Teaching is not seen as important.
Participant three: Well that’s sort of belongs with conservatism really.
Participant two: Funding and promotion for research but not for teaching. (M-C transcription excerpt)

This perceived promotion of the value of research over that of teaching must be understood in the context of the nature of the participants who were attracted to the mini-conference program. As noted earlier, the majority of participants are employed by universities or on campuses that, prior to 1988, were teaching-only institutions. These institutions merged with universities with a traditional focus on the value of research and that have only begun to consider explicitly the quality of teaching in recent years. It is arguable that lecturers who worked in the pre-Dawkins universities may be in a better position to perceive a growing valuing of teaching, than those who previously worked in teaching-only institutions. While a small number of participants argued that "things are changing" and that teaching is becoming more valued and better rewarded, all agreed that excellence in teaching is not rewarded as greatly as excellence in research, and that to advance their careers, time would be better spent on research and publications. It was also noted that research into teaching and learning was perceived as a lowly pursuit compared to research and development in ICT-related areas.

**Limited academic freedom**

Limited academic freedom includes comments about controls or guidelines for production of materials, decisions about particular platforms or courseware tools and issues about intellectual property. Many participants observed that they have less flexibility in and less control over the subjects they teach in terms of how and when they are taught. They described an increasingly centralised organisation of teaching, such as timetabling:

Another inhibiting factor that I've found is that we have centralised timetabling now that's things are locked in a year ahead, what the number of contact hours and what kind of classroom you've got for your subject and for example, I didn't want two hour blocks, but I'm stuck with it for second semester this year.
I'll swap, I'd like two hour blocks.
I wanted single one-hour blocks. Replicated six times.
But that is important because we very rarely get to have the choice of what kind of blocks we want and that's typical as well. (M-C transcript excerpt)

This centralised organisation was seen as less flexible and less able to quickly respond to the needs of teachers and, therefore, as inhibiting innovation. Increasingly bureaucratic systems were also seen as inhibiting innovation. In particular, participants described the development of online or flexible materials to be more highly scrutinised than other types of materials and modes of delivery.

I thought we might have touched on the … over regulation. [What] I’m getting at is this um notion that you can employ a lecturer, you can give them some ideas of what you want in the course and they'll go into a classroom and teach. If you want to do the same thing online, you've got to go through umpteen committees, approval from the, you know where and all sorts of other -- over regulations from outside interests before you get even onto the web site. You know that sort of thing has changed and not many people are aware that it's shifting [in] that direction. Centralised, corporatised teaching is what you’d call it. (M-C transcription excerpt)
This increased scrutiny of materials was seen as a result of university marketing and branding. It was also seen as part of a movement to standardise educational products and services that are delivered via different modes to different types of student. Many participants described the development, in their universities, of multimedia development units who "packaged" content so that it had the professional and consistent "look" that the university marketers were aiming for. This trend was seen more as a marketing ploy than as motivated by educational aims. Many participants discussed the growing push for educators to provide content as a challenge to their academic freedom and to their personal approaches to teaching:

Participant: I've got one more inhibiting factor, in terms of the university policy towards initiatives, in many cases there's a removal of control from the academics like at [my university] we have [a resource unit], which, from the university perspective are responsible for the flexible delivery, but what happens is that academics end up working for them rather, rather than them working for us, so that we're the providers.

Moderator: You're the content provider?

Participant: Yeah.

Moderator: And they wrap it up?

Participant: And they wrap it up and in many cases they wrap it up in a non-innovative way.

Moderator: So how would you …

Participant: Well I think I would just describe it as a removal of control if you like.

Moderator: Of your material?

Participant: Of any form of initiative in some cases. (M-C transcription excerpt)

Another source of loss of control that was described was Universities’ purchase and support of particular courseware programs. Participants generally agreed that this would be enabling for many educators, but they supposed that for ICT educators it was more of an imposition because of their own knowledge of software development and skills in web site production and HTML.

Student demand

Student demand includes comments about students’ demands for particular content and for particular modes and also to student resistance to the teaching of "the fundamentals" and to innovative teaching methods.

Student resistance was expressed in terms of students' expectations and resistance to new ways of teaching and learning. Participants describe conservatism in students who expected traditional modes of delivery. They described students who "just want the answers" and who resent being asked to participate in innovative activities, such as group work or problem solving.

Participants described students’ responses and demands as being increasingly important because of the increasing client-focus of education. This was discussed in terms of increasing fees and in an increasing focus on student evaluation of teaching.

I think our fee paying overseas students in particular are being much more vocal and demanding more quality and that's certainly a driving factor. (M-C transcription excerpt)
Well they’re our customers and our clients and that’s the service we’re providing, a crash education, crash training. (M-C transcription excerpt)

The positioning of students as clients was seen as problematic by many participants who argued that the satisfaction of students’ short-term goals was sometimes at odds with their long-term outlooks. Students were generally described as not being good judges of what was good for themselves; they were seen as misinformed and to have misconceptions about what their courses were all about.

But it’s even more fundamental than that because a lot of the students don’t appreciate that some of the fundamentals are essential to the fluffy things that they want to do, like data bases – "Who wants to study data modelling?" You know. "I just want to learn how to write a web page". Well I’ve got news for you pal, take a job at the Age, work on their breaking news site, which is run by one of our ex honours students, and you wont write a bit of HTML, it’s all done by back end database and ASP and things like that. … a lot of them wanting to get up the you beaut latest and brightest stuff don’t know what they mean. (M-C transcription excerpt)

Factors influencing student demand included their perceptions of employers’ needs and their perceptions about what was valuable in ICT education. Preferences for traditional modes of teaching and learning was discussed in terms of what the students were used to, that is, their expectations, and also to students’ changing circumstances and their lack of time for approaches that foster a deeper understanding of content.

Conclusion

The data presented here illustrate those factors identified by ICT educators as driving and inhibiting educational innovation. Factors were labelled individual 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 and student demand. In discussions about these factors, elements of the changing broader context of university teaching were raised. This broader context included an increasing pressure on universities to compete with each other for students and for funding, an increasing pressure on university departments to save on costs and to raise money, an increasing standardisation and branding of educational products and services, an increasing internationalisation of education, increasing pressure on university educators to provide vocational education, the rapid development of information and communication technologies, and an increasing focus on how these new technologies can be used to deliver educational products and services. Participants saw this changing context of university teaching as the result of Government and university level policy.

More often than not, the factors described were seen as inhibiting good educational practice, rather than promoting it. When participants spoke about the factors driving educational innovation in their disciplines, these factors were usually problems that needed to be survived. Even when participants described individuals’ desire to be better teachers, this motivation was often a response to a problem seen as arising from recent changes in the broader context of university education. This context was seen by many as inhibiting pro-active educational innovation. In particular, many of the factors described as inhibiting innovation were linked by discussions of the need for universities to compete, the increasing workload of academics and the lowly status of teaching and educational research compared with that of research activities and research into ICT-related areas. These issues were seen by many to contribute to the riskiness of educational innovation and to the lack of an environment that supported risk-taking behaviour.
Many of the participants were enthusiastic users of information and technology and leaders in the use of new technologies in teaching in their disciplines. Many were involved in implementing the flexible delivery of courses in their departments. However, a phenomenon that was repeatedly described as “the push for flexible delivery” was consistently described in negative terms. Participants raised concerns about the motivations behind top-down pushes for web-based delivery of content, a perceived lack of pedagogical frameworks to support new modes of teaching, the amount of time needed to plan and implement new modes of teaching and perceived misconceptions at management level regarding the amount of work involved in offering online or mixed modes of learning.

While all of the factors described can be said to apply to university educators generally, some were supposed by participants to be experienced more acutely by ICT educators. In particular, the development of new content and student demand were seen to be factors that more acutely affect ICT educators as they strive to keep up with their discipline areas. The pressure to develop more content is compounded by students’ misconceptions about ICT education and their demands to learn the latest in ICT fashions, and by perceived desire of employers for up-to-the-minute training in graduates. These issues raise questions about the purpose of higher education and the role of ICT university educators.

**Limitations**

The main limitation of the study reported here is the way in which participants were recruited. Participants self-selected into the study. We can safely assume that those who participated have an interest in teaching and learning. Participants were not a random sample of ICT educators and we cannot safely make assumptions about those ICT educators who chose not to participate. We do not know why ICT educators might have chosen not to participate. Possible reasons include unavailability on the days offered, inability to invest the time required (a whole day), lack of interest in the subject of the study, or failure of departmental contacts to pass on invitations.

Observations and conclusions made here need to be qualified by an acknowledgment of the types of people who provided data. However, some comfort can be taken in the diversity found in those people who did participate, and in the consistency of issues raised despite this diversity. Participants included both junior and senior staff from a range of ICT subject areas. Though the majority of participants were teaching staff, administrators and support staff were also represented. Both men and women participated (66% and 34% respectively). Participants were from a large number of universities and each state and territory was represented. Despite this diversity, the same factors were repeatedly raised at each mini-conference. A further limitation to the study is due to the type of data that was collected. The mini-conferences were used to collect qualitative data only. While they yielded a rich body of data on issues of concern to ICT educators, we do not have data on the relative importance of issues.

The data presented here complements the raft of existing analysis and commentary on the implications of changes to the higher education policy environment on the practice of higher education by providing an account of how one body of educators perceives recent changes to, and future directions of, their teaching practice.
Bibliography


