



The crisis in ICT education: An academic perspective

Tony Koppi, Fazel Naghdy, Joe Chicharo

Faculty of Informatics
University of Wollongong

Judy Sheard

Faculty of Information Technology
Monash University

Sylvia Edwards

Faculty of Information Technology
Queensland University of Technology

David Wilson

Faculty of Information Technology
University of Technology Sydney

A national Discipline-Based Initiative project for ICT, funded by the ALTC, has sought to identify the issues and challenges facing the sector. The crisis in ICT education spans high schools, universities and industry. The demand for skilled ICT graduates is increasing yet enrolments are declining. Several factors contribute to this decline including the perceived quality of teaching and a poor perception of the ICT profession amongst the general public. This paper reports on a consultation process with the academic community. Academic concerns include the capacity of the sector to survive the downturn, and improving relationships with industry which should benefit students, academics and industry. An outcome of the consultation process has been the formation of the Australian Council of Deans of ICT (ACDICT) which will have broad responsibility for addressing the issues affecting ICT higher education.

Keywords: ICT, consultation, university, education, enrolments, challenges, perception, ICT council

Introduction

This paper reports on a Discipline-Based Initiative (DBI) for Information and Communications Technology (ICT) education in Australia. This national project, based at the University of Wollongong under the directorship of Professors Joe Chicharo (Dean, Faculty of Informatics) and Fazel Naghdy (Head, School of Electrical Computer and Telecommunications Engineering), is concerned with improving education and the student experience in the broad range of ICT disciplines. The project is partnered by Monash University, QUT, and UTS, and is supported by The Australian Learning and Teaching Council.

The seven ICT disciplines (Electrical Engineering, Computer Engineering, Telecommunications Engineering, Software Engineering, Computer Science, Information Technology, and Information Systems) cover a wide spectrum with Engineering-related disciplines at one end and business/commerce-related disciplines at the other. The issues and challenges facing the ICT education sector are broad and complex and include the interrelated areas of high schools, tertiary education providers (dominated by universities), industry, professional bodies and government. A major reason why ICT education is in crisis is because of declining enrolments (Dobson, 2007) despite increasing industry demand (Davidson, 2005; Foresighting Working Group, 2006; Australian Government SkillsInfo Vacancy Report, 2007; ACS, 2008). ACS (2008) note that the ICT skills shortage will grow 29% by the year 2010 to just over 14,000 jobs unless immediate action is taken. The statistics given by Dobson (2007) illustrate a marked average decline in enrolments of over 18 % in the period 2002 to 2005 with recent DEEWR (2008) figures indicating that the rate of decline of eligible applicants is showing signs of slowing with only a decline of 11.4% between 2006 and 2008.

One of the factors contributing to the crisis is concerned with the perception of ICT and an ICT career amongst school students (Multimedia Victoria, 2004, 2007). While this group of young people showed a range of positive attitudes towards ICT, a major barrier to further ICT study was the perception that a job in ICT involves sitting in front of a computer all day and that an ICT career would be boring.

There is a renewed optimism for healthy growth of the sector at least during this decade (Newstrom, 2005). Growth is expected to take place concurrently in all four major sectors of ICT i.e., hardware, software, services and communication. The growth and expansion of ICT will have two major impacts on ICT education: more trained human resources will be required at all levels including maintenance, design, development, implementation and leadership; concurrently, new developments and inventions will create new fields in ICT which will demand the introduction of new courses and training programs at all levels.

Project scope

The most recent study on ICT higher education was carried out before 2001 by Monash University (Higher Education Division, Department of Education, Training and Youth Affairs (AUTC), 2001) with a specific focus on the nature and extent of innovation in teaching practice in tertiary ICT education. This current project has the broad aim of scoping the issues and challenges facing ICT education and the initial exercise was to consult with a broad range of academic stakeholders. This paper reports on the findings from that consultation process.

Method

The consultation process included interviews and surveys of a broad range of academic stakeholders. Those consulted included Deans and Heads of School, the Australian Council of Professors and Heads of Information Systems (ACPHIS), and the Heads and Professors of the Computing, Research and Education Association (CORE) as well as attendees at various conferences covering the ICT spectrum. Forums were held at a range of conferences, such as the International Conference on Engineering Education and Research, the Australasian Computing Education Conference, and the Australian Software Engineering Conference. Over 100 written submissions were received as well as over 20 interviews and transcripts.

Results and discussion

Findings from the consultation process have been distilled into the following seven major issues and challenges which are briefly summarised. They are not in any particular order and overlap to some degree.

A representative academic peak body

Many academics expressed a concern that the university ICT sector was fragmented and lacked a representative voice. There were various specialised academic organisations (such as ACPHIS and CORE) but no single group represented the ICT spectrum. This situation was lamented and contrasted with other disciplines such as Engineering and Science each of which had existing representative councils which have the capacity to monitor and implement changes affecting education in their disciplines.

Following a meeting of 31 university representatives in Sydney in February 2008 along with senior representatives from industry who urged formation of a council, the academic members unanimously endorsed the establishment of an ICT Council. In July 2008, ICT representatives (nominated by the VCs of every Australian university) met to formally establish the Australian Council of Deans of Information and Communications Technology (ACDICT) with a Foundation President, Executive and Constitution.

Perceptions of the profession

A recent study by Multimedia Victoria (2007) mirrors the concerns expressed by academics, industry and professional bodies in that the ICT profession is not clearly understood by the community at large and that perceptions are often erroneous. It is also not easy to identify with an 'ICT Professional' because the profession has no clearly identifiable stereotypes. Academics thought that vague and erroneous perceptions begin in high school and that industry could do more to improve the image of jobs and careers in ICT.

Declining student enrolments in ICT higher education

The decline in enrolments has resulted in universities downsizing in ICT and lowering entrance requirements, both of which affect the quality of the educational experience and threaten the ability of departments/schools to survive the downturn. Surviving the enrolment downturn whilst industry demand is increasing is a major concern because the capacity (including decreasing postgraduates) may no longer be there when enrolments increase. It has been suggested that there should be a combined university and industry focus on high schools for university intake purposes to meet the skills shortage.

Educational quality of ICT in schools and universities

A common belief is that the teaching of ICT in high schools is of poor quality because of the shortage of suitably qualified teachers. It is also felt that there is a decline in the quality and rigour of maths and science (enabling subjects for ICT) in high schools. This is broadly supported from various sources (e.g., Bohannon, 2007). As a result, universities are concerned about having to lower entrance requirements.

Academic staff believe that universities need to improve the curriculum and keep up to date with rapid advances in ICT which are characteristic of the industry. The ongoing professional development of academic staff is a concern, as well as the difficulty in identifying and sharing good educational practices. It is widely recognised that necessary improvements in the quality of ICT teaching in schools and universities requires more funding support from government which should provide funding for ICT education at the same level as science and engineering to more accurately reflect the teaching requirements.

Industry engagement in ICT education

Since technological advances frequently occur in industry, and the industry requirements of graduate skills can change rapidly in relation to the pace of curriculum developments, greater involvement of industry in education and curriculum development is welcomed. An industry-integrated curriculum would also lead to better informed teaching staff and greater student satisfaction. Industry contribution to high school ICT teaching may also help improve poor perceptions of an ICT career and increase student interest.

Improve relationship between industry and university

There is considerable recognition by industry and universities that relations have not been optimal and there is a common desire to improve the situation for mutual benefit. Lack of a shared vision has given rise to an academic conception that industry is remote from and sceptical about university education. Conversely, employers believe that universities are not interested in meeting industry requirements. Other potential educational benefits include industry sponsoring more student places to enable greater work-based learning and the provision of industry experience for lecturers.

Graduate capabilities

There is a tension between universities preparing industry-ready graduates with good social skills, critical and creative thinking, and problem-solving abilities, and the development of in-depth discipline knowledge.

Conclusion

A major concern giving rise to the crisis in ICT education is that of falling university enrolments despite industry demand for graduates and a skills shortage. As enrolments decline, universities downsize thereby reducing capacity to meet industry demand for skilled graduates. Declining enrolments also results in lowering of university entrance requirements which exacerbates the ability to produce graduates with relevant skills. Perceived causes of declining university enrolments in ICT are the quality of ICT teaching in high schools and the perception of ICT jobs and career amongst the public generally.

The quality of ICT education in universities is also of concern. Less students and reduced capacity is one aspect; lack of engagement with industry by staff and students is another. Work-based learning, industry placements and working on industry projects are all thought to benefit students by giving them real-world practical experience. While these strategies are of great benefit to students and industry, a perhaps overlooked factor is the opportunity for academic staff to keep abreast of technological advances which

often occur in industry. In fact suggestions have been made for regular industry placements of academic staff for professional development purposes.

It is widely thought that industry could do more to promote the ICT profession and that government could address the issue at all levels. In general, the relationship between industry and universities needs to be improved particularly with respect to the development of industry-integrated curricula.

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Contact Author: Tony Koppi, Faculty of Informatics, University of Wollongong, Wollongong, NSW, Australia, 2522. Email: tkoppi@uow.edu.au

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