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## Issues in Australian ICT education

Tony J. Koppi  
*University of Wollongong*, tkoppi@uow.edu.au

Fazel Naghdy  
*University of Wollongong*, fazel@uow.edu.au

Joe F. Chicharo  
*University of Wollongong*, chicharo@uow.edu.au

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## Issues in Australian ICT education

### Abstract

This session at the Australian Software Engineering Conference is concerned with ICT education from the holistic perspective of preparation in high schools, the university experience, transition to the workforce, and the contribution by industry, government, and professional bodies. The project to ascertain the issues and challenges facing the national ICT education sector is supported by the Carrick institute as a discipline-based initiative. Consultations to date with various stakeholders have revealed numerous concerns that include: the dispersed nature of the ICT sector; erroneous perceptions of ICT disciplines; decline in enrolments; gender imbalance; lack of industry involvement; and balancing knowledge with generic skills acquisition. This forum will involve the project team and invited participants to report on findings from consultations and research. Attendees will be invited to respond and to contribute their issues and challenges that are of particular concern to the software engineering community. The seven disciplines that comprise ICT are electrical engineering, computer engineering, telecommunications engineering, software engineering, computer science, information technology, and information systems.

### Keywords

ict, australian, issues, education

### Disciplines

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## Special Session: Issues in Australian ICT Education

Tony Koppi, Fazel Naghdy and Joe Chicharo  
*Faculty of Informatics, University of Wollongong, Australia*

[tkoppi@uow.edu.au](mailto:tkoppi@uow.edu.au)

[fazel@uow.edu.au](mailto:fazel@uow.edu.au)

[chicharo@uow.edu.au](mailto:chicharo@uow.edu.au)

### Abstract

*This session at the Australian Software Engineering Conference is concerned with ICT education from the holistic perspective of preparation in high schools, the university experience, transition to the workforce, and the contribution by industry, government, and professional bodies.*

*The project to ascertain the issues and challenges facing the national ICT education sector is supported by the Carrick Institute as a Discipline-Based Initiative.*

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*This forum will involve the project team and invited participants to report on findings from consultations and research. Attendees will be invited to respond and to contribute their issues and challenges that are of particular concern to the software engineering community.*

*The seven disciplines that comprise ICT are Electrical Engineering, Computer Engineering, Telecommunications Engineering, Software Engineering, Computer Science, Information Technology, and Information Systems.*

### 1. Introduction

In 2006 the Carrick Institute for Learning and Teaching in Higher Education funded a Discipline-Based Initiative (DBI) for ICT education in Australia. Following a literature review [1] [2], a project manager was appointed mid-2007. This paper reports on initial

consultations with academic staff in senior and general teaching positions.

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. This broad spectrum is itself problematic in that there is a range of views as to what should comprise ICT, and that in itself illustrates a lack of cohesion in the sector.

The issues and challenges facing the ICT education sector are broad and complex and include the interrelated areas of high schools, tertiary education providers (which are dominated by universities), industry, professional bodies and government. The perceptions of ICT held by teachers, career advisors, parents, the general public and those portrayed by the media concerning the nature of the ICT sector all influence the perceptions held by students contemplating an ICT career in high schools and beyond. These perceptions have influenced enrolments in ICT in the university sector, and the statistics given by [3] illustrate a marked average decline in enrolments of over 18 % in the period 2002 to 2005 with recent DEST figures for 2006 indicating a deepening decline. These data by [3] for ICT applies to a narrower spectrum than given here but they are still indicative of a national trend.

The Special Session at ASWEC is part of the stakeholder consultation phase where project progress is disseminated and members of the ICT community are asked to contribute their concerns, issues, challenges and preferred outcomes for the DBI ICT project. The session will enable participants to express their views in an open forum designed to discover the prevailing views of ICT education amongst the software engineering community.

## 2. Consultation and survey methods

To facilitate discussion at the session, findings from consultations do date will be presented.

Ongoing consultations with academic staff have been by interview of one or more persons at a time and via questionnaire of individuals from the university sector. Questionnaires have essentially been to evaluate issues and statements made at interview to gauge wider validity and to ascertain different views across the ICT spectrum. The scoping and dissemination strategy has included consulting groups of ICT people gathered for special events such as conferences. In general, there is broad agreement about the issues and challenges facing the whole spectrum.

## 3. Consultation and survey results

Consultations have revealed numerous concerns across a broad range of issues, some of which are presented here. The ICT sector is seen as fragmented and dispersed with the lack of a unifying peak body. This contributes to a large number of stakeholder groups having been nominated – more than 25 have been suggested. The current widespread decline in ICT enrolments is a serious threat despite the upturn in industry demand. Erroneous perceptions about the ICT disciplines and job prospects are seen as contributing to this decline. The lack of women in ICT and the high dependency on overseas students are also concerns. Industry involvement in education is generally thought as being worthy of improvement.

At the time of writing during an ongoing scoping process, the results from the questionnaires (which are based on consultations) give strong agreement with the following ten statements (n=39).

1. The perception of the ICT profession amongst students (high schools and university) should be improved.
2. What ICT is as a profession needs to be clearer to the public.
3. High school careers advisors need to be better informed about the ICT profession.
4. The sector needs to identify and share good educational practices
5. Links between high schools, universities, and industry should be strengthened.
6. Former graduates in the workforce can provide valuable perspectives on their curriculum and should be consulted about improving their degree experience.

7. ICT students need workplace experience
8. Industry should engage more in ICT education at all levels.
9. ICT students need to work on authentic industry projects.
10. Adapting the ICT curriculum to technology changes can occur more effectively through closer ties between teaching and research

There is also broad agreement that the project should not focus only on universities, and that the project should be more concerned with learning and teaching rather than fundamental research.

## 4. Discussion

The first three questionnaire points with which there is broad agreement is that the perception of ICT as a profession is not clear to students (at both high school and university), the general public, and careers advisors. The latter are seen as important because they can influence students at critical times when career choices are being made. However, perceptions of ICT as a profession may be negative amongst students whatever the shared (or otherwise) perceptions of careers advisors [4].

Presently in Australia there is a well-recognized skills shortage, including ICT, and it is felt that the pervasive negative perceptions amongst the community about a profession in ICT is at least partly due to general lack of information in this regard. As such, stronger marketing has been suggested, including more favorable media reporting. It has also been suggested that Industry could play a larger part in media advertising and awareness raising.

The fourth statement recognizes that good teaching occurs in ICT and that it would benefit the sector if these practices were identified and shared. This was the focus of the project [5] which identified national teaching innovations and good educational practices at the time. A rapid method for identifying good practices in tertiary ICT teaching was also proposed by [6]. The identification, dissemination and adoption of good teaching practices and designs in academia is problematic [7] and outside the scope of this paper.

The fifth statement recognizes the interrelationship between high schools, universities and industry and that these links should be strengthened. Statements seven, eight and nine are in the same vein and emphasis the importance of industry involvement in the education of students.

Statement six which is concerned with seeking the opinion of graduates in the workforce was also

recommended by the [5] project. Apparently this kind of survey is rarely done yet it should provide valuable feedback to the academic community on the most useful aspects of degree programs relative to graduate employment.

Statement ten recognizes that technology changes are relatively rapid and that keeping up to date with teaching requires ongoing research activities. Respondents have commented that significant innovations occur in industry and that academics in ICT must be prepared to adapt more rapidly than in most other disciplines. This can be problematic because of the timescale required to revise the curricula of degree programs. This further highlights the potential benefit from surveying graduates in the workforce after about two years employment.

The special session at ASWEC will enable the community to comment on issues of particular relevance to them.

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