Australian Council of Deans of ICT

ACS (ACDICT), P.O. Box Q534, QVB, Sydney NSW 1230
www.acdict.edu.au

SUBMISSION TO THE BASE FUNDING REVIEW

from the

Australian Council of Deans of Information and Communications Technology (ACDICT)

31 March 2011

ACDICT President:
Associate Professor Peter Cole
President ACDICT
Dean, School of IT, Murdoch University

Contact:
Dr Tony Koppi MACS CP
Executive Officer, Australian Council of Deans of ICT (ACDICT)
0410 427 543
tkoppi@gmail.com
http://www.acdict.edu.au

Introduction

The Australian Council of Deans of Information and Communications Technology (ACDICT, http://www.acdict.edu.au) is the peak body representing all Australian universities and the many disciplines comprising Information and Communications Technology (ICT):

- Computer Science
- Information Systems
- Information Technology
- Software Engineering
- Electronic Engineering
- Computer Systems Engineering
- Telecommunications Engineering
- and any other ICT related discipline

Realistically, there is almost no part of work, the economy and society that is not dependent on information and communications technology. The prosperity of a developed nation and its future depends on ICT which runs business, science, engineering, transport, infrastructure of all kinds, and the quality life in general.

ICT comprises many interrelated disciplines and higher education students participate in a range of learning activities and environments. At one extreme students work on software development, service development and delivery, and on the other extreme they build and test computer and telecommunications hardware of various kinds. The range includes various combinations of: computer laboratories and design studios; laboratories for designing and building software and hardware; simulation laboratories comprising audio-visual equipment and other hardware; and software development and testing laboratories. Learning activities also involve students obtaining workplace experience through a range of means that include industry placements at one extreme and simulated industry experience at the other. The aim of tertiary higher education in ICT is to produce an ICT Professional able to contribute to the many demands and challenges of society, the economy, and the environment.

Questions and responses

Q1.1 *Government investment in higher education has been justified in terms of delivering benefits to the economy, benefits to society and equity of access for students from all socioeconomic backgrounds. Should these principles continue to be applied, and if so how should they be used to determine the appropriate level of government subsidy for the cost of universities' learning and teaching activities?*

The world runs on hardware and software created by ICT specialists. Developed societies and their economies depend on the physical infrastructure and services that are designed, built, maintained and operated by computer hardware and software. Australian ICT graduates are the major source of ICT Professionals to the Australian industry, business and government sectors. There is currently a chronic short supply of Australian domestic ICT graduates. As a matter of principle, the government must accommodate the increasing demand for skilled ICT graduates by providing access for students from all socioeconomic backgrounds.

The economy and society will also benefit from the recognition of the importance of skilled ICT professionals including the value of the vastly under-represented female contribution. To reap these benefits, greater incentives may need to be provided to encourage more females and students from all socioeconomic backgrounds to engage with ICT as a professional career.

Q1.2 *What principles should determine the appropriate balance of resources contributed by:*

· Government;
· students; and
· other sources
towards the cost of undergraduate and postgraduate education?

Employers of ICT graduates, graduates in industry and academia (Koppi and Naghdy, 2009) and the professional accreditation body (Australian Computer Society) greatly value industry experience. Most ICT undergraduate degrees are of 3 years duration and it can be challenging for the universities and students to include a professional experience program even though academia, industry and graduates appreciate the value of this. The breadth of study necessary to educate an ICT graduate increases as the discipline continually incorporates new technologies and adding industry experience through work integrated learning (WIL). There may be scope for the creation of four-year degree structures for ICT graduates (the norm currently being three years) considering the ever-increasing importance of appropriately skilled graduates to the national economy.

Industry provides financial contributions through scholarships for placements to a small percentage of undergraduate students administered by the ACS Foundation (an independent body to the ACS) and considerable in-kind contributions in the form of curriculum industry advisory bodies, student placements, student projects and guest lectures. However, a recent survey of ICT graduates in industry has revealed that the majority of graduates believe their exposure to professional practice was inadequate as an undergraduate student.

A principle should be to increase the provision of professional experience by industry by providing greater industry incentives for participation. Likewise, to increase greater student participation in an industry with a large skills shortage, a principle should be to decrease the cost to students.

Q1.3 *What other principles, if any, should influence the level and distribution of government subsidies for tuition costs in higher education*

A principle should be concerned not only with addressing the needs of students and employers in any particular critical industry but also with being flexible and responsive to changing needs. ICT is a dynamic global industry and changes in any discipline specialisation or geographic need (regional and international) needs to be balanced with the appropriate support to maximise opportunities and returns on investment to the nation. The principle is that subsidies are flexible and targeted for maximum impact in meeting changing needs. This means that the government needs to be well informed as to where current need is the greatest and to act accordingly. ACDICT is willing to assist in this regard.

Q2.1 *What are the best international measures of course quality that would provide appropriate benchmarks to inform judgments about the appropriate level of base funding for Australian universities?*

ICT programs of one to two years (Masters degrees), three and four years (full-time equivalent undergraduate degrees) duration undergo professional accreditation by the Australian Computer Society. The accreditation processes and educational outcomes attained are internationally benchmarked though membership of the standards-based international Seoul Accord (2008) agreement operated by an international alliance of professional ICT accreditation bodies. Membership of this accord, together with the national and global network of ICT educators, ensures that best practices in ICT education, innovation and accreditation are well understood and disseminated.

Q2.2 *What are the best international measures of student engagement that would provide appropriate benchmarks to inform judgements about the appropriate level of base funding for Australian universities?*

A recent survey (current project funded by the Australian Learning and Teaching Council: Ogunbona, 2009) by a group of universities that teach ICT has shown that student motivation and engagement is a result of complex interaction between academic achievement, a broad range of university experiences, and personal life matters including financial ones. In many cases students leave their ICT course or university for personal reasons that are independent of learning and teaching in the discipline. The quality of courses, teaching, or student engagement, cannot be judged by attrition rates.

Student engagement can be maximised by ensuring that the base funding enables the provision of all necessary learning and teaching equipment, facilities, environments and staffing levels for a world-class education experience.

With respect to student engagement, DEEWR (2009) – Transforming Australia's Higher Education System – noted that (p14):

> "Although student satisfaction levels remain high, Australia has fallen behind its major competitor countries on key teaching and student experience indicators and drop-out rates remain high at 28 per cent in 2005. Similarly, the dramatic rise in student-to-staff ratios—from about 15:1 in 1996 to over 20:1 in 2006—is probably a significant contributor to the relatively low levels of student engagement."

International measures of student-to-staff ratios (SSR) would be a useful benchmark for appropriate base funding levels regarding student engagement. This is considered further below.

Q2.3 *Is there a system of higher education funding in another country that would be a useful benchmark model to inform Australia's review of base funding?*

The systems of OECD countries, such as the UK and US should inform Australia's base funding. The Bradley Review (Bradley et al., 2008) and DEEWR (2009) reported a steady increase of the academic SSR since 1995. The Higher Education Statistics Agency (HESA) of the UK notes that a SSR of 10:1 is the benchmark for excellence (e.g., The Times, 2008). With respect to Computer Science and IT in the UK, the top 30 universities had an average SSR of 11.6 for 2010 (Guardian University Guide, 2011) and for Australian Information Technology (a subset of ICT) in 2007 the SSR (including full time and fractional staff) was 29 and for 2008 was 30 (based on DEEWR HE statistics). Clearly, the SSR for ICT in Australia is a long way from the benchmark for excellence.

To ensure quality ICT education, ACDICT would wish to see base funding to enable a SSR of between 10:1 and 15:1 which is closer to the 10:1 benchmark for excellence in the UK.

With respect to supporting students at all levels of socioeconomic background, the previous UK government had a target of 50% young people attending university. However HESA reports that although numbers had increased, there was no significant change to the social background of those entering university. It would appear that base funding needs to be specifically targeted to address this issue.

While an adequate SSR is a large factor contributing to a quality ICT education, another major factor lies in the funding cluster. As noted in the introduction, ICT covers a broad range of disciplines and to label the range as "computing" in funding cluster 3 is erroneous and probably based on a widely held false belief that ICT is all about sitting in front of a computer. While this may be the case when dealing with programming, this is only a part of the learning and teaching in the range of ICT disciplines. The ICT discipline learning space requirements are multifaceted. In addition to standard classroom environments with audio-visual equipment, the following are also an integral part of teaching and learning: computer laboratories that can support use of a wide range of specialist software; internetworking laboratories that provide access to sophisticated networking equipment including routers and switches; and design and construction laboratories for hardware and electronics classes. The reality is that physical laboratories are required for the building and testing of hardware and electronics as well as audio-visual laboratories for the design and creation of models and simulations as used in education, medicine, science, engineering, and the visual and performing arts. The creation of real-world simulations requires real-world components. Along with engineering and science, ICT learning and teaching support includes skilled laboratory technicians.

ACDICT asserts that the majority of ICT disciplines have comparable demands to engineering and science and belong together in funding cluster 7. Where ICT disciplines only require computing and design laboratories (and not because they are forced into a narrow inadequate teaching approach because of funding constraints), they should be in a lower cluster. ACDICT is willing to engage with DEEWR to clarify these issues.

Q2.4 *What is the connection between the level of base funding and quality outcomes?*

For ICT, base funding determines the factors that lead to quality outcomes: the student-to-staff ratio; the learning facilities and environment; support available to students (from whatever economic background and gender); the ability of universities to provide the administrative requirements for work integrated learning practice; and universities being able to adequately address the chronic skills shortage in the workforce. As noted above, the SSR for ICT is well above the number expected for excellence. ICT as part of funding cluster 3 does not enable universities to provide the students with the optimal learning experiences for most ICT disciplines; the majority of ICT should be grouped with engineering and science because of comparable requirements. Sub-optimal base funding also impacts on the support available for minority groups. Work integrated learning (WIL) is strongly desired by academia, students and industry, and professional practice experience is recognised as an essential quality outcome but the administrative overload often prevents universities being able to provide an optimal service. Also, incentives for greater industry/university liaison regarding WIL would benefit all stakeholders. Adequate base funding would enable universities to better address the chronic skills shortage which is unlikely to improve in the near future under the present circumstances.

In summary, ACDICT asserts a strong connection between quality educational outcomes and adequate base funding.

Q3.1 *Do the current funding relativities reflect the relative cost of delivering undergraduate courses in particular disciplines? What, if any, relative weightings should be afforded to various discipline groups and why?*

As noted, ACDICT represents a broad range of disciplines most of which are closer to the engineering and science funding cluster 7 than any other funding cluster. Relative weightings could be devised and applied across the range depending upon the amount of necessary and desirable infrastructure and administrative costs. For example, where laboratories and skilled technicians are required for the designing building and testing of components, a higher weighting could be applied than where teaching is mostly concerned with software in computer laboratories. Weightings would also need to be designed and applied for each of the factors affecting quality outcomes, such as WIL which applies equally to all the ICT disciplines. The SSR also applies equally to all the ICT disciplines, as does support for minority groups.

Q3.2 *What are the costs to universities of improving the quality of teaching and the quality of the student learning experience at the undergraduate level and to what extent should they be reflected in the base funding model?*

Most universities have central learning and teaching units, and some have faculty-based initiatives that are aimed at improving the quality of learning and teaching and the student learning experience. Generally within an institution, there is little cross-disciplinary sharing of best practice in learning and teaching because most academics believe their discipline is unique. This can be justified axiomatically in that distinct disciplines exist because they are different. It can rightly be argued that unique differences need unique teaching approaches. In addition the generic skills apply across disciplines. Thus each discipline has a combination of discipline-specific teaching and generic teaching requirements and costs to universities to improve quality must be at the discipline level and this should be reflected in the base funding of the disciplines.

There are exemplary learning and teaching practices in the disciplines at many locations but there are few mechanisms for dissemination across institutions. This was a particular strength of the Australian Learning and Teaching Council which funded collaboration between disciplines in different institutions and dissemination mechanisms. In the absence of such a funding body, additional base funding will be necessary to enable cross-institutional activities and improvements across the sector.

Q3.3 *What are the costs of engaging low SES students in undergraduate education? Should such costs be a factor in determining base funding? How might support for low SES students be maintained in the future?*

The additional costs of attracting, recruiting, engaging and supporting low SES and other minority students (particularly women who make up 15–20% of the ICT workforce) should be included in ICT base funding. Such additional funding should be weighted towards disciplines where there is a chronic shortage of skilled graduates and a marked gender imbalance.

Q3.4 *What additional costs are involved in the provision of work integrated learning and should these be considered in setting the level of base funding?*

Work integrated learning (WIL) in ICT is highly desired by academics, graduates, employers and the professional accreditation body (Australian Computer Society). ACDICT and the ACS are currently working towards establishing a minimum WIL component for all undergraduate students. Currently there are different WIL practices across the ICT sector ranging from a few weeks to 2 semesters of WIL in undergraduate degrees. Many universities find the administrative costs of supporting a WIL program that involves industry partners prohibitive. Students are often required to make their own arrangements in finding industry placements and may receive no academic credit for participation.

In an already stressed student-to-staff ratio (SSR) in ICT, there are considerable time costs to academic staff in establishing and maintaining industry contacts to enable WIL, particularly in the supervision of professional work placements. Addressing the SSR through adequate base funding in

ICT would enable universities to provide a better professional WIL experience for students and participating industry partners.

Q3.5 *What proportion of a higher education teacher's time should be spent on scholarly activity and how could the costs of scholarship be included in the base funding model?*

Scholarly activity underpins discipline research and research into learning and teaching. About 30% of a full-time academic's time is spent on discipline based scholarly activities and about 10% on scholarly activities related to teaching making a total of about 40% on scholarly activities. The current large SSR in ICT has a marked impact on scholarly activity time and jeopardises the quality of research and learning and teaching. The cost of scholarship can therefore be addressed with an adequately funded SSR.

Q3.6 *Should any research activity continue to be supported by base funding?*

Depending upon the institution, 20–40% of a full-time academic's time is dedicated to discipline-based research and most of that is concerned with scholarly activities. These activities are necessary to keep abreast of discipline developments and maintain the nexus between teaching and research. Discipline-based teaching is refined and modified by advances in discipline research as well as being influenced by the scholarship of teaching which includes feedback from peers and students. Some research time can routinely include research into the effects of different teaching approaches and would therefore be supported by base funding. Such research activities are necessary to enhance the quality of teaching and should be supported by base funding.

An ICT academic's discipline based research requires laboratory, workshop, computer and technical support that will also be used by students at all levels; students will also use specialised equipment obtained by research grants which illustrates cost benefits of the nexus between research and teaching.

Q3.7 *Should infrastructure investment continue to be supported by base funding?*

Infrastructure investment must necessarily be supported by base funding otherwise the facilities for learning and teaching cannot be guaranteed. As student participation in higher education increases, base funding needs to keep pace with further infrastructure requirements.

Sharing of laboratories and other teaching spaces already occurs within institutions and some institutions and disciplines collaborate in sharing teaching facilities and expertise over the Internet. Continued support of the infrastructure for online learning, teaching and research is necessary to address uneven discipline expertise and maximise participation from diverse communities.

Q3.8 *What other factors, if any, should be taken into account in determining base funding for teaching and learning in higher education?*

As indicated above, online infrastructure is essential to accommodate collaboration between institutions in teaching and research and to support increasing participation in higher education of remote and diverse communities. Educational opportunities will increase to utilise improved broadband capabilities (NBN rollout) in Australia provided that the costs are included in base funding.

Q4.1 *Is there a higher relative cost for postgraduate coursework degrees? If so why is there a difference and what is the extent of the difference compared to an undergraduate degree in the same discipline?*

There is little difference in the infrastructure cost of undergraduate and postgraduate coursework degrees in ICT. However, there is often increased cost due to smaller class sizes and different teaching methodologies used at the postgraduate level.

Q4.2 *Are there other factors that contribute to the costs of postgraduate coursework degrees that should be acknowledged in the base funding?*

Where a postgraduate ICT coursework degree includes an industry project and other professional practice experiences, there are the associated administrative costs in developing and maintaining industry partners and costs of site visits for supervision purposes.

Q5.1 *Are there general principles that should determine the maximum contribution a student should make towards the cost of their education in a publicly funded higher education system?*

Most ICT undergraduate degrees are of three years duration except where students participate in 9–12 months industry placements, such as sandwich courses of four years. These internships are desirable and valued by academia, graduates in industry, employers and the professional accreditation body. There are numerous benefits to all the stakeholders involved. Undergraduate students are reluctant to embrace these four year programs because of the extra fees incurred and the loss of income by a deferred graduation. The extra fees and income loss can take years to recover from. Furthermore, many students have regular jobs as undergraduates (probably essential for low SES students) and internships of even short duration can disrupt this perhaps vital financial income and increase the attrition risk. Universities are also reluctant to offer four year ICT degrees, even though the benefits to all stakeholders are well known, because of the student financial pressures.

A general principle should be one that encourages undergraduate industry internships and does not financially penalise the student. This principle should also take note of the greater vulnerability of low SES students.

Another principle should be concerned with addressing the chronic shortage of skilled ICT workers by reducing the student contribution to encourage greater enrolment in ICT courses.

Q5.2 *In what circumstances should the level of students' contribution towards the cost of their courses be based on factors other than the cost of their tuition?*

In addition to the principle of incentives to encourage greater enrolments in ICT, further incentives should be specifically targeted at female students to remedy the chronic shortfall of female participation in the ICT industry which has never risen above about 20%. The value of the female contribution to the ICT industry is well recognised but can be difficult to address with the continuing short supply of female ICT graduates.

Q5.3 *Should the basis for determining the level of contribution by the student towards the cost of their tuition be different at the postgraduate level?*

For ICT, the same issues and principles apply to postgraduates as given for undergraduates under Q5.1 above. To encourage a more highly skilled ICT workforce that has long been suffering a shortage of skilled ICT workers, reduced fees should be offered to encourage further study.

Q6.1 *To what extent does the base funding model provide incentives for institutions to invest in and deliver high quality teaching?*

Academic staff in all institutions strive to provide high quality teaching within given constraints. A major constraint in providing learning and teaching excellence is poor funding. The more funds that are available, the more would be invested in teaching (particularly in an adequate SSR, as well as staff development opportunities), facilities for teaching (laboratories, equipment, learning spaces) and providing the infrastructure for a high quality student experience such as being able to work on industry projects and placements to gain professional experience.

Given the chronic shortfall of skilled ICT workers, improved base funding would enable universities to engage in greater liaison with high schools, not only in marketing activities but also in providing the skills and information to high school ICT teachers and careers advisors to ensure their knowledge and skills are up to date and not at a level that deters students.

Q6.2 *Does the base funding model provide incentives for institutions to maintain strong academic standards?*

As indicated above, academic staff will always strive for the highest academic standards. Limitations are dictated by financial constraints. Without financial constraints, strong academic standards and graduate outcomes are more likely to be maintained.

Q6.3 *What features could be incorporated in the design of a new base funding model to make it more simple, transparent and responsive to higher education providers?*

Unfortunately a base funding model that takes into account all the factors necessary to provide a high quality ICT education to a broad range of students to meet industry and society demands is not likely to be simple.

To be responsive to higher education providers, funding for ICT needs to be stratified in several ways to take into account a range of variables, for example:

- differences in the teaching requirements of the range of ICT disciplines
- industry demands for specific skills in a dynamic and rapidly changing environment
- student support and incentives for low SES students and minority groups such as women
- teaching enhancements that include administrative costs such as in the provision of internships

If simplicity is a driving factor, then the single most important feature that would make the biggest difference on all fronts is that of a student-to-staff ratio as close as possible to 10:1. Given that single correction, particularly to disciplines where there is a chronic industry shortage of skilled graduates, universities would adjust internally to maximise desired outcomes.

Continuing stakeholder consultation

The Australian Council of Deans of Information and Communications Technology (ACDICT) is willing to participate in further consultation. Members of the ACDICT Executive can be contacted via: http://www.acdict.edu.au/executive.htm

Associate Professor Peter Cole
President ACDICT
Dean, School of IT, Murdoch University

References

Bradley D, Noonan, P, Nugent H, Scales, B, 2008, Review of Higher Education. Department of Education, Employment & Workplace Relations, Canberra. www.deewr.gov.au/he_review_finalreport

DEEWR (2009) Transforming Australia's Higher Education System. http://www.deewr.gov.au/HigherEducation/Pages/TransformingAustraliasHESystem.aspx

Guardian University Guide (2011) (http://www.guardian.co.uk/education/table/2010/jun/04/university-guide-computer-sciences-and-it)

Koppi, T & Naghdy, F (2009), Managing Educational Change in the ICT Discipline at the Tertiary Education Level. http://www.altc.edu.au/system/files/resources/DS6-600%20Managing%20educational%20change%20in%20the%20ICT%20discipline%20March%202009.pdf

Ogunbona, P. (2009) Addressing ICT curriculum recommendations from surveys of academics, workplace graduates, and employers. PP9–1274, current ALTC Project.

Seoul Accord (2008) http://www.abeek.or.kr/accord/contents.jsp?menu_l=144

The Times (2008) How the guide was compiled. http://www.timesonline.co.uk/tol/life_and_style/education/sunday_times_university_guide/article2497779.ece