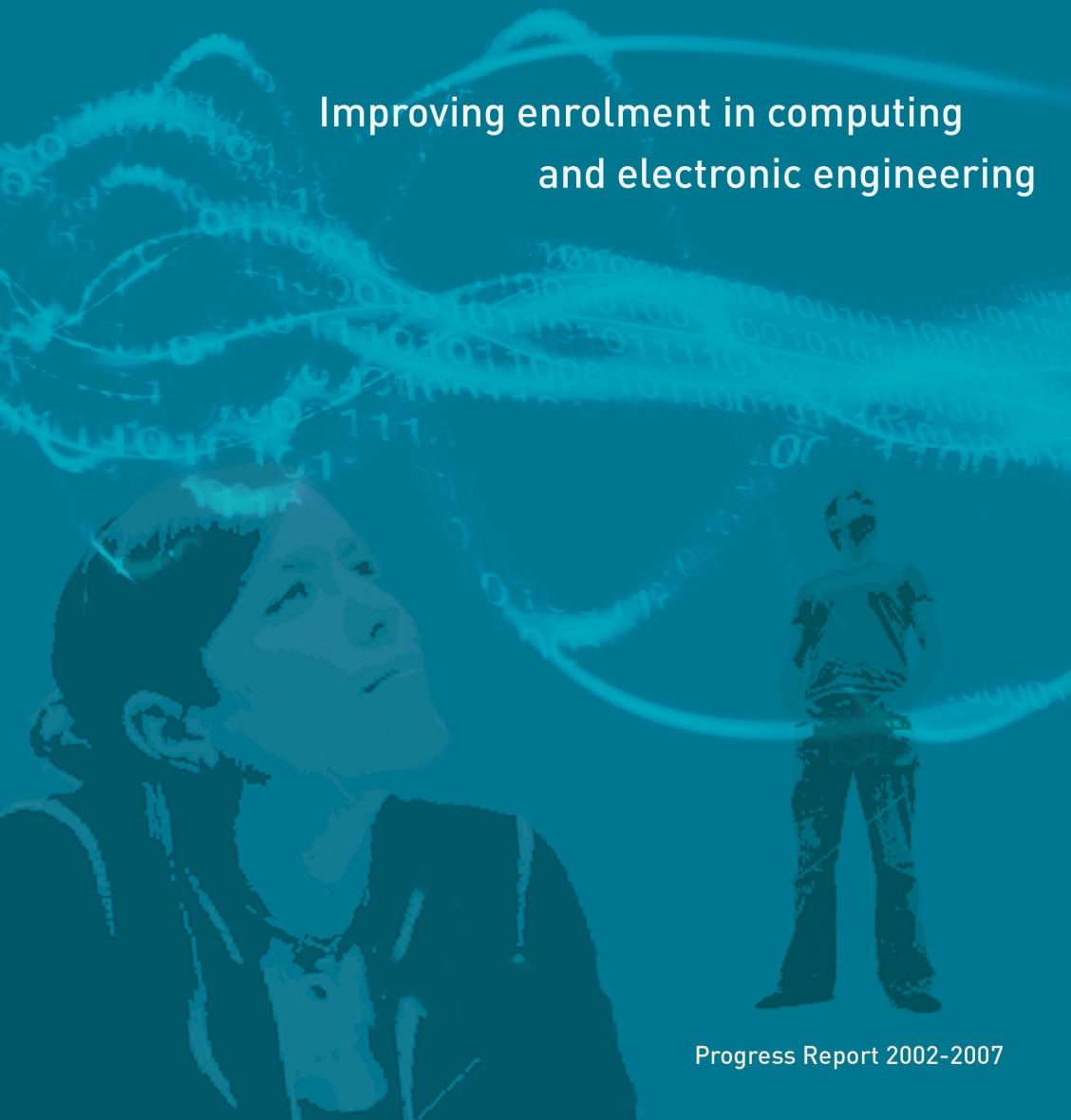# HEA

Higher Education Authority
An tÚdarás um Ard-Oideachas

Improving enrolment in computing
and electronic engineering
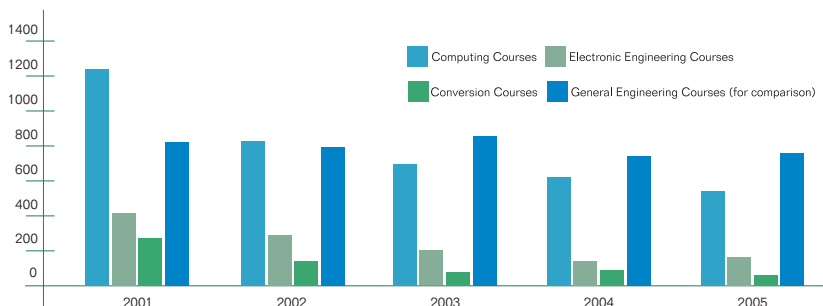
Progress Report 2002-2007

Contents

1 Introduction

The HEA has played a central role in the development and implementation of the Government's strategies to address skills shortages - including representation on the Expert Group on Future Skills Needs since its creation. Since 1997 the HEA has allocated in excess of €300 million in public funds to courses for specific skills needs creating an additional 5,400 ICT places.

During the period from 1996 to 2001 new enrolments in Computing and Electronic Engineering courses more than doubled. The ICT industry is prone to cyclical business swings and experienced a severe downturn in 2001-2002. As a result since 2002, there has been a fall off in enrolments in these courses which is a matter of concern to the HEA, the higher education institutions and industry.

While the industry itself has been recovering since 2004 enrolments have continued to decrease. Table 1 sets out enrolment statistics for a selection of university courses which highlight the issue. Part 3 of this report sets out some actions taken by the HEA to address the situation, but the problem of low take up of these courses persists.

Enrolments on University Engineering and Computing Courses 2001-2005

Legend:
- Computing Courses
- Electronic Engineering Courses
- Conversion Courses
- General Engineering Courses (for comparison)

It is the view of the HEA that if current trends are to be reversed it will require focussed, concerted action by a range of stakeholders. The HEA has taken a number of actions to address the issue during 2002-2006. In November 2006 the HEA organised a workshop of representative academics from computing and electronic engineering disciplines to review the current situation on enrolments and to discuss the remedial actions being taken by their institutions with a view to finding common ground on areas of priority and identifying practices which have made an impact. This report contains a memorandum of this meeting.

An analysis of the recent 2007 CAO 1st preferences by the HEA shows that an additional 5% have indicated a preference for computing courses over 2006; electronic engineering continues to decline in preferences. Hopefully this increase is a result of the various promotional programmes that have been undertaken and certainly suggests that they should be continued.

2 Actions Taken by the HEA to Address Falling Enrolments on ICT Skills Courses

In response to reports of identification of ICT as a national priority, the HEA responded to the various Expert Group on Future Skills Needs with the provision of additional capital and recurrent funding to universities. From 1997 to 2004 recurrent funding for the creation and expansion of courses to meet identified ICT skills shortages was provided to universities on a per capita basis, with earmarked annual funding for each additional student admitted. As enrolments on a number of these targeted courses declined following the dramatic falls in the market value of ICT stocks and in ICT employment, the HEA moved quickly to support the retention of the academic infrastructure in these key areas. From 2003/04 onwards additional funding was provided to prevent the dismantling of capacity built up by the earlier investment.

The HEA through the Information Technology Investment Fund has since 2002, provided each of the third level institutions an average of€60,000 per annum to improve retention on ICT skills courses. Many of them are using this funding for both retention and recruitment programmes.

The HEA has been concerned by the fall off in enrolments on Computer Science and Electronic Engineering Courses at Third Level. Of major concern is the fall off in female enrolments. The proportion of females enrolling on these courses has fallen from 32 % in 2001 to 18 % in 2004, representing 50 % of the overall decline, while the proportion of females attending third level overall continues to increase. Further, as females represent over 60 % of those receiving over 400 CAO points, the percentage of high points achievers enrolling in computing has also declined. This is of growing concern to

industry and the research community. An analysis of the courses that have had increased enrolments from females during this period indicates a preference for the ' caring' professions with increases in nursing, teaching and the life sciences. To address this issue the HEA is promoting the development of new bundled courses to Third Level Institutions, such as business and computing.

The Fourth Report of the Expert Group on Future Skills Needs published in October 2003 forecast growing shortages of graduates in both computing and electronic engineering, commencing in 2006.

In November 2003 these concerns were presented to the HEA and agreement to provide funding from the Information Technology Investment Fund for a promotional campaign to address the declining enrolments was given.

In 2003 €120,000 was allocated to the PR campaign to address the declining enrolments in Computer Science. Of this €20,000 was used to develop marketing material including a promotional DVD. The balance was distributed to 20 Third Level Computer Science departments for the promotion of their courses and careers in information technology.

The HEA cooperated with the Irish Computer Society on the promotional campaign called Choose IT. The ICS have developed a web site; www.chooseit.ie; targeted at school students, as a way of interesting them in careers in computing. ICS distributed an information pack on computing careers to over 400 schools promoting the web site and included a copy of the HEA DVD.

As members of the ICT Ireland Education work group, the HEA has highlighted the need for industry to be proactive in promoting careers in ICT. ICT Ireland now organises a Champions campaign. Volunteers from industry visit schools to promote ICT careers in a coordinated programme. Likewise the ICT Ireland/HEA sponsored Internship program is being supported as a way of promoting ICT careers. It is hoped that the commitment for work experience will clarify the career opportunities, in particular to parents. The HEA is providing funding of€450,000 per annum from the Information Technology Investment Fund for this programme.

A group comprising Fórfas Discover Science and Engineering, Engineers Ireland, ICT Ireland and the HEA (Represented by Professor Michael Ryan from DCU); have cooperated on a PR campaign for ICT careers. This campaign called 'Areyouupforit' used a combination of radio and web advertising to a web site where a prize competition was held in the hope of attracting interest from participants in ICT. Preliminary acceptance data from the 2007 CAO show a modest increase in computing and a continued decline in electronic engineering.

3 Workshop to Address "Improving Enrolments on Computing and Electronic Engineering Courses"

Objectives

The workshop was convened by the HEA for the express purpose of problem solving the general deficit in enrolment on computing and electronic engineering 3rd level courses, that has been apparent in the past 4-5 years. A subsidiary and related issue is that of retention of students on the same programmes.

The Workshop was held within the context of on-going progress by the "ICT Campaign 2006" Action Group in finalising plans to initiate a short-term promotional campaign and to develop a long-term strategy to address the issue and was intended as complementing that work.

Higher education institutions have also been active in developing new and innovative measures to address enrolment and retention issues. A range of initiatives have been embarked upon, with varying levels of success. It was felt that, by bringing together the key players in those efforts and pooling their ideas, other strategic options for tackling the shortfall, perhaps with HEA support, may emerge.

The Panel

The academics who agreed to give of their time (some initial individual discussion, plus a half-day workshop) were as follows:

- Dr.David Abrahamson, Head of School, Computer Science and Statistics, Trinity College Dublin
- Professor Ciaran Murphy, Business Information Systems, University College Cork
- Professor Michael Ryan, Computer Applications, Dublin City University
- Ms. Deirdre Lillis, Head of Department of Computing and Mathematics, Institute of Technology, Tralee
- Mr. Pat Coman, Head of Development, Institute of Technology, Tallaght
- Mr. Larry McNutt, Head of School, Informatics and Engineering, Institute of Technology, Blanchardstown

In the week before the workshop, the facilitator made telephone contact with each participant to discuss their ideas and agree which of them they would elaborate on at the workshop. On the day the group as a whole were asked, having heard all the inputs, to prioritise the top 2 or 3 initiatives that they would put forward as most worthy of support.

Workshop

The meeting was attended by the panel as above (Ciaran Murphy participated over a video-conferencing link from UCC), Tom Boland, Chief Executive of the HEA, Pat O'Connor, Head of ICT Skills, HEA and Garry Hynes, as facilitator

After a brief brainstorming session, the meeting heard from each contributor in turn. Inputs, including questions, averaged about 20 minutes each. Towards the end of the session each participant offered his/her 6 nominations for action arising from the presentation. This provides the pattern of preferences shown in Appendix 1. Clearly there were linkages within the wide scope of topics and these were reflected into five groupings:

1   Generic promotion of courses and careers.
2   Weighting of Computer Sciences Courses in the HEA Funding
         Allocation Model
3   Direct financial incentives
4   Institutional initiatives to attract and retain students
5   Adult education initiatives

1   Generic Promotion of Courses.

This topic was discussed at some length (recorded as F. "Address the "Job Image" in Appendix 1). All agreed that the message on the availability of quality career prospects was the key factor influencing enrolments. While academics engaged in teaching courses had a role in their promotion, by and large such promotion responsibilities should be carried out by dedicated recruitment officers in the institutions as academics did not have enough time to devote to this activity.

Potential students and their parents/families needed to be given the information necessary to enable them to have a better understanding of where a career in ICT could lead them and thus help overcome the perception of ICT as a career negative. The reality was that a wide range of careers were available to graduates in ICT and there needed to be segmentation of the audience in devising messages to students, teachers, parents etc. Overall, there needed to be more context-ualising of the career of ICT graduates.

There was general agreement that the positive message of ICT, as the basis for a career, needed to be more widespread in the schools system and some saw transition year as providing some potential for student/ school/higher education institution interaction. There was also a general view that institutions in any case needed to go out to schools and a view that peers were often better at conveying messages about careers in ICT, although the higher education institutions needed to be careful to monitor and control the situation.

The work of the "ICT Campaign 2006" Group was endorsed with a recommendation that a longer-term strategic campaign be boosted with greater investment. Such a campaign should address the need for segmented messages directed at the three key constituents of pupils, teachers and parents.

2   Weighting of Computer Science in the HEA Funding Model.

The members of the panel expressed their dissatisfaction with the decision to place Computer Science in the fieldwork category in the new HEA funding allocation model. They pointed out that these courses often involved more laboratory time than science and some engineering programmes. They believe that there is a misconception that laboratory time only involves access to standard PC's when in fact they often teach hardware-based subjects across all four years of the undergraduate degree programme. Equipping hardware laboratories is a very expensive proposition, with a lot of items being purchased on a once-off basis to meet the needs of individual final year projects, etc.

On the funding issue there was also some concern that some institutions may not properly allocate "skills" funding in cases where the institution did not have a strong commitment to skills programmes.

3   Direct Financial Incentive.

Consideration should be given to providing a direct financial incentive to participants who enrol on ICT courses. This could take the form of a scholarship or could be a stipend paid the same as to attendees on FÁS training courses. Alternatively, if a national educational voucher system was introduced, it could be used by participants to offset other or future educational costs, such as equipment or post-graduate courses.

4   Institutional and industry initiatives
to attract and retain students

A number of the Institutions have initiatives focused on school transition year pupils. This usually involves the pupils spending up to a week working on interesting/exciting projects. A good example in this category would be ComputeTY which has been run for the past four years by DCU. It has involved bringing a Transition Year class onto campus for a week and involving them in a course on web design. They have managed, with some stretching of resources, to cover four schools per year and, though there are no solid metrics, feel that this activity has stemmed the tide away from ICT courses. Similar initiatives are in place in TCD and IT Blanchardstown.

It was felt that this model could work well if widened out from web design to embrace other aspects of the computing job; was made fun and resourced adequately. A key determinant of success of any recruitment and retention programmes was the perception of the careers available and here industry had a job to do. In some ways the computer industry were a part of the problem in the kind of work and conditions provided to graduates which were sometimes less rewarding than the reasonable expectation of these graduates.

5   Atypical initiatives

While some proposals were directed at sowing the seeds for the future and have a long "gestation" period, there were some working examples of ways in which a more immediate return can be generated by focussing on more flexible programmes designed for atypical students. In this context modularisation of programmes had a particular role to play.

Some interesting models of practice were outlined and discussed.

For the last three years IT Tralee has employed a full-time Recruitment and Retention Officer. A significant feature of the Officer's work has been a focus on non-standard/ mature students (FETAC progression, VTOS groups etc). The investment has seen measurable positive outcomes on key deliverables - e.g. first year intake has doubled, from 35 to 70, between 2004 and 2006. The gender balance is also much better than with the CAO cohort.

The FLASH programme (Higher Certificate in Electronic Engineering) at IT Tallaght, is a blend of laboratory and classes with a high degree of flexibility that aims to accommodate different levels of maturity and work experience. For instance, classes, laboratory and support sessions are duplicated within the week to give time options. There is extensive devolution of responsibility to students in these and self testing and benchmarking is widely available. IT Tallaght also have a full-time Project Manager to handle interaction with students and this is having a positive impact on retention levels.

HEA Response to Issues Raised at the Workshop

Weighting of Computer Science in the HEA Funding Model

Under the ICT skills programme the same per capita funding amount was provided to computer science, information systems and computer engineering courses up to 2005. Under the Recurrent Grant Allocation Model(RGAM) introduced from 2006, some of these subjects will now attract a subject price group weighting of 1.3 and others 1.7. Both of these weightings generate per capita funding which are higher in real terms than the 2005 levels.

An independent audit of student numbers data which drives the model is being undertaken by the HEA at present. As part of this process higher education consultants have been asked to examine and report on the comparability of the range of ICT courses assigned to each of the two possible subject price groups. Their findings will be considered by the HEA.

One of the design objectives of the new RGAM was to provide some measure of international benchmarking in the funding model. The adoption of the English/Welsh HEFCE price relativities provides a very valuable measure of relative, although not absolute, benchmarking. Where there is a valid case for the provision of additional funding to protect and support strategically important and vulnerable subjects it would be possible to do this through targeted measures which would not disturb these relativities.

Allocation of Skills Funding in Universities

HEA recurrent funding is provided as a block grant to institutions with the subsequent internal allocation a matter for the university. Up to 2006, recurrent grant funding for ICT skills courses was co-financed from the European Social Fund and the NDP, and was therefore subject to additional formal reporting and audit requirements. The requirement to maintain a transparent audit trail in relation to this funding has been explicitly stated in annual grant allocation letters from the HEA.

Workshop's Conclusions

There was a general sense from those academics present that there was a crisis in ICT which required a kind of "war cabinet" approach if it was to be solved. A solution would also essentially involve partnerships across education and training.

There is no single initiative that will immediately reverse the decline that has been experienced in enrolments on computing and electronic engineering courses. While there remain a number of significant inhibitors, participants at the workshop remain optimistic that a variety of coordinated campaigns, involving the key stakeholders, can gradually reverse the trend.

An intervention such as direct financial incentives might have an immediate impact, but it if failed to do so could have a long term commitment with no return. The focus on attracting more mature students, on the other hand, has an immediate impact, provides an excellent return on investment and also address equity of access issues.

The focus on interesting pupils in transition year to attractive careers would appear to be the most beneficial long term initiative. While there may be no guarantee of success in its primary purpose, it will in any event have long term education benefits. The use of recruitment/retention officers is proving successful in a number of institutions both in attracting more students; particularly mature students; and improving the completion rates of those enrolling.

Appendix 1:

Initiative									Total	Group
A	Recruitment/Retention Off.		✔		✔	✔	✔	✔	5	4
B	E-Learning, WebCT		✔					✔	2	4
C	Programming Support Centre						✔		1	4
D	Post-Graduate visits									1
E	Programming Competition									4
F	Address ¨Job Image¨	✔	✔	✔	✔	✔	✔	✔	7	1
G	ComputeTY +	✔	✔	✔	✔	✔	✔	✔	7	4
H	FLASH Model				✔	✔		✔	3	5
I	Get Industry on Board									1
J	Collaboration with Plc Colls.	✔		✔					2	5
K	Market to CAO choices			✔					1	1
L	Scholarship	✔	✔			✔	✔		4	3
M	Student-centric approach	✔		✔	✔				3	4
N	Segment Message (merge with F)									1
O	The Funding Model	✔	✔	✔	✔	✔	✔	✔	7	2

HEA

Higher Education Authority
An tÚdarás um Ard-Oideachas

The Higher Education Authority
Brooklawn House,
Shelbourne Road, Dublin 4.
Tel: +353 1 231 7100
Fax: +353 1 231 7172
Lo-Call: 1890 200 637
e-mail: info@hea.ie
website: www.hea.ie

An tÚdarás um Ard-Oideachas
Teach Plasóg an tSrutháin,
Bothar Síol mBrain,
Baile Átha Cliath 4.
Guthán: +353 1 231 7100
Faics: +353 1 231 7172
Lóghlo: 1890 200 637
ríomhphoist: info@hea.ie
gréasán: ww.hea.ie