Crisis for cutting-edge professional development: a case study in forensic computing

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Professional development in the UK
It has been said many times before, by many people, that someone growing up today may expect to completely change career paths on more than one occasion in their working life. Less clear has been the process by which this might be achieved or the national infrastructure which should be in place to support this.

The Chancellor of the Exchequer and the Secretary of State for Education and Skills in the UK commissioned the Leitch Report (Leitch, 2006) which identifies the urgency of addressing the skills shortage in the UK. While recognising that the percentage of adults receiving Higher Education in the UK is comparable to the average of international spending, the report concludes that the UK is not, and far from, world-leading. The UK invests 1.1% of GDP (Gross Domestic Product) in HE compared to 2.9% in the USA and 2.6% in South Korea. The Leitch Report concluded that universities have an important role in lifelong learning working in partnership with companies. Innovation happens quickly but is a mismatch between the needs of employers and university course portfolios. Leitch suggests the focus of Higher Education institutions now needs to be widened to encompass the whole working age population.

The new discipline of forensic computing
The European Information Society Group (EURIM) published a third discussion paper as part of the IPPR E-Crime Study drafted by UK MPs which stated:

We have around 140,000 police officers in the UK. Barely 1000 have been trained to handle digital evidence at the basic level and fewer than 250 of them are currently with Computer Crime Units or have higher-level forensic skills.

This lack of expertise nationally is a ‘crisis’. There is an urgent need for certification, accreditation and qualifications in the criminal justice sector. The European Union has funded a range of projects to develop course materials to support pan-European cooperation and development of training programmes such as the AGIS programme (AGIS, 2003) and the involvement of the author in this new area of computing stems from this programme.

University courses in forensic computing
The Information Technology sector has undergone a dramatic downturn in the last five years; with a drop of approximately 40% in undergraduate applications for computer science related courses in the UK. In 2001, a significant loss of jobs in the industry occurred when many development and middle-management jobs were shed; outsourced overseas or back-sourced to the USA. This was one of the latter effects resulting from the earlier dot.com bubble collapse in the late 1990s. The consequential bad press regarding these job losses, and the widespread number of companies involved, changed the public
perception of computing as a safe-bet for career prospects to a less-certain, almost risky, option. The total number of UCAS (UCAS, 2007) applicants nationally fell in the next 5 years. As job opportunities in the IT sector recovered in the UK, the number of applications for computing related programmes have been slow to return to pre-2001 levels. The fall in numbers has seen the closure of some computing departments, with very few departments nationally not losing posts even if closure has been averted. This decline is a world-wide phenomenon, with job losses in Australia and the USA being particularly significant. Universities have reacted by developing postgraduate courses in new areas, accepting the need to refocus staff. Some university computing departments have rushed to produce forensic computing courses to fill the gap caused by falling numbers of undergraduate and postgraduate applications for computing and computer science courses.

The course development discussed in this paper came about in this period of decline for the Department of Computing at Canterbury Christ Church University (CCCU, 2005). As a direct consequence of its need to explore new areas and generate new student numbers, forensic computing was investigated. There was a clear recognition to look outwards to the needs of the marketplace and better align the Department of Computing’s course portfolio to meet a real demand; as now suggested in the Leitch Review Report as a major consideration for universities across a broad spectrum of subject disciplines.

In 2002 the Head of the High Tech Crime Training Unit at the NPIA (National Police Improvement Agency) (NPIA, 2008) (up until 2007 under its former name (CENTREX, 2007)) recognised the need to take the training provided by his organisation and move it up a level to produce qualifications to support the career development of experts in this new field. The first approach to consider a joint development of this kind was made by the NPIA to 13 universities with existing interests in the field of Crime and Policing. There was a follow-up meeting at NPIA involving Canterbury Christ Church University and NSLEC to look at the possibilities for developing a joint programme. It was agreed that this should take the form of an MSc qualification, which was subsequently validated and first offered from September 2005. The Masters course has itself been the focus for a number of joint developments with the NPIA in the Forensics Computing area including establishing an annual international conference (CFET, 2007) and a new undergraduate degree (CCCU, 2007).

What was noticeable at the time, however, was that the universities were reluctant to take up this invitation from the NPIA to collaborate:

1) The need for collaboration originated outside of the university sector;
2) Less than half of the 13 universities invited to meet to consider possible developments responded positively and sent a delegate to the original meeting called by the NPIA in February 2003;
3) Of the universities that did attend the meeting, only one, Canterbury Christ Church University, decided to take the development forward; and then only after the delay of a year between the NPIA meeting and the decision to go forward;
4) Over a year elapsed between agreeing to take the development forward and a new course provision being finalised – which says something about the need to develop faster QA processes for course planning and validation.

Clearly there is still some way to go in building bridges between the university and industry and commerce sectors if this experience is anything to go by.
Difficulties with funding student places for study

While the initial response for funding student places was good for the MSc Cybercrime Forensics, the tightening-of-belts in regional police funding nationally has resulted in some students leaving before completion of the programme and a major difficulty in recruiting a full cohort of students in 2008.

Employers funding course places

Funding to allow students to attend the MSc Cybercrime Forensics course is entirely employer depended (from each of the 43 regional police forces) who themselves are subject to funding reductions and efficiency drives; where staff development expenditure is an easy and obvious target for cuts. One might criticise these employers for maintaining a short-term view but practicalities demand operational expenditure takes precedence over more strategic matters.

If employers are unable to fund staff development then are here are two obvious alternative solutions to this problem which suggest themselves. Firstly, an individual student could consider funding themselves. Secondly, the Government, or some third party, could sponsor students to complete a course.

Individuals funding their own study

There has not been a long tradition of students funding their own Higher Education without major subsidy in the UK. The majority of course fee costs (both for full and part-time study) were heavily subsidized by the UK Government even up until a few years ago. While it still might have seemed expensive to UK citizens, in relation to studies in some countries it would have been considered inexpensive. As a society we are still coming to terms with the new reality of course fees. The message has had more effect in the undergraduate market mainly because the student loan provision (with retrospective pay-back of loans after completing a degree) has been introduced successfully. However, no coherent postgraduate provision exists.

Government funding for student study

It is very clear where postgraduate places are funded by the Government (in Scotland for example) MSc courses flourish in comparison with areas where they are not (England) on a like-for-like comparison of subjects. But postgraduate education is expensive and constant pressure to reduce numbers of places is a constant issue. The situation is further exacerbated by the political decisions being taken with regards to funding postgraduate studies in the UK. In July 2007 the UK Government announced additional support for the Widening Participation agenda at undergraduate level (BBC, 2007a) to help in meeting its own target of 50% participation in Higher Education by 2010. This measure came in the context of dramatic falls in the number of adult learners in 2007 reported by NIACE (National Institute of Adult Continuing Education) (NAICE, 2007) of more than 700,000 adult learners. The mechanism for paying for these measures became clearer in September 2007 when the Universities Secretary, John Denham MP, instructed the Higher Education Funding Council to switch £100m per year from postgraduate to undergraduate funding (BBC, 2007b). More recently proposals signalling withdrawal of funding for ‘equivalent or lower level qualifications students’ will again hit many universities (BBC, 2008), especially those specialising in part-time education such as the Open University (OU, 2008) or Birkbeck College – University of London (Birkbeck, 2008).
Difficulty in developing infrastructure new course provisions

The MSc Cybercrime Forensics exemplifies this issue very well. This specialist subject demands specialist facilities (computer laboratories, computer software, computer hardware, expensive staff development) requiring a high set-up and maintenance budget. To get a course off the ground is also expensive in terms of staff time, energy and commitment. With cohort sizes varying with economic circumstances, it can be difficult to justify the considerable investment needed to facilitate this type of course. The solution, in this case, has been to develop an undergraduate provision in addition to the postgraduate provision, promising an additional income stream. Spreading the risk in this way has helped on the basis that any specialist facilities required to deliver the masters course are unlikely to be fully utilized (at least in the early years) and efficiencies can be gained by shared access. The Department succeeded in attracting a viable undergraduate cohort in 2007/8 and early indications from UCAS and EU applications to the programme suggest that this will be continued in 2008/9. As an approach, supporting professional postgraduate awards with parallel developments at undergraduate level can be very successful. However, the undergraduate marketplace can itself be subject to very big changes for a variety of uncontrollable reasons.

Fickle marketplace for undergraduate students

In all but a few specialised areas, where undergraduate training would be prohibitively expensive if it were not for significant Government subsidy (the study of medicine being an obvious case), a free-market economy exists where the degrees on offer have to compete for student numbers. As a result some subject areas have declined in popularity, from standard subjects offered universally at universities to those one might find only in a few specialist universities or those with significant reputations and high-status. The list of these subjects includes mathematics, physics, chemistry and, more recently, computer science. Even well-established subjects at universities with high status have not been immune to closure if numbers of undergraduates decline past a viable level. Examples are the closures or threats of closure or amalgamations including chemistry at University of Swansea (BBC, 2004), physics at Keele University (Guardian, 2004), and mathematics at Hull University (Guardian, 2005).

To some extent this decline may be put down to school-leavers:

• seeking safer degrees which are assumed to be less difficult/numerate;
• looking for degrees in more exciting and interesting subjects having been turned off subjects at school (IT teaching at school has been cited as a reason for the decline in computer science);
• selecting a wider range of subjects earlier in their studies as schools move away from traditional subjects at A level into more application -orientated subjects such as photography, drama, media studies etc;
• following trends and fashions created in the media.

This last point would seek to explain some of the very large increases in applications as a result of drama series based in a particular subject being aired on television. The most quoted example to the author is the rise in psychology applications as a result of a new series of ‘Cracker’ (ITV, 2008) but this could be apocryphal.
Conclusions
The following two points seem to sum up the commitments which have to be pursued if the current instability and short-term view in the professional training marketplace is not to continue.

Need for stability
Without stability each of the stakeholders in the process have a very much reduced incentive to engage in professional development. Students do not know which subjects or courses to follow because of a rapidly changing variety of titles with a reduced prospect that they will graduate with a degree which still has currency with the job market. Universities revert to short-term planning decisions as funding fluctuates and are forced into difficult decisions regarding staff redeployment, redevelopment or redundancy. Companies are more reluctant to invest in risky long-term commitments with university training partners when short-term operations can be maintained with less-expensive solutions. The Government needs stability to ensure financial resources are directed where they will have most impact rather than being wasted as sea-changes occur. Making the undergraduate market more stable will directly effect the professional development postgraduate market. The undergraduate market is the ‘powerhouse’ for many university departments providing the bulk of income. Picking off postgraduate training/development as the only area for change will not achieve the objectives. Stability is a grey scale and how far along it we need to move before we see the benefits is unclear but necessary if the economy is to attain the benefits envisioned in the Leitch Report.

Closer management of resources to real need in the economy
Just because a large number of students wish to study subject X rather than subject Y does not mean they should be supported in doing so. If the economy has a need for 10,000 jobs per year in a subject X then why should the country support the education of 50,000 students in subject X? The old argument that the important thing is that a person is educated up to a graduate level - and that a graduate is capable of being retrained in another discipline for the workplace - belongs in the 1960s and 1970s when under 15% of school leavers progressed to university. Today with more than 40% going to university the opportunities to retrain are more limited and expensive. Employers can more directly select the graduates they require in a subject area; needing to pay for a minimum of expensive retraining. This does not mean that there is no opportunity to study for a degree in subject X and go on to a successful career in subject Y, but rather that it is an expensive route to a career, there is less money in the system to facilitate it and consequentially it is less likely to happen. Perhaps the solution here is to move away from the Government’s simplistic, one-dimensional, metric of percentage involvement in Higher Education to metrics relating to the size of shortfalls within the wider economy and the numbers of jobs being lost to overseas markets.

Each of the stakeholders has a part to play and must change. It is not just a Government responsibility alone, as the measures they can control directly are limited. They may be able to apply large resources but it’s debatable how sophisticated the cause-and-effect can be. A clue to this is crude level of control can be seen in the very round numbers cited as targets (50% participation in HE by 2010) or in the funding committed (numbers rounded to the nearest million or tens of millions of pounds sterling).
The particular difficulties are now faced in new, cutting-edge, developing areas of education where the natural market would be for postgraduate students going through retraining or refocusing their careers. Leitch Report identified that:

… furthermore, employers need clearer incentives and mechanisms to engage with and invest in HE. Without addressing these issues, the UK faces the risk that the productivity benefits from increasing numbers of highly skilled adults are not fully realised.

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