In defence of IT in Australian schools: A critique of No train no gain

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ABSTRACT

In November, 2005, an article entitled No train no gain (Thorp, 2005) quietly appeared in The Australian. In the closing paragraphs of the article, the President of the Australian Computer Society placed the blame for the falling number of students enrolling in IT courses at university on how IT is taught in our schools. This paper is written in response to this accusation and in defence of Australia's teachers and IT curricula. Accusations like this, however specious, need to be challenged to prevent their gaining credence through repetition. Accusations made by groups with the status of the Australian Computer Society similarly need to be challenged before they become the cornerstone of policy directives. This paper identifies a number of problematic definitions and assumptions underlying the accusation and suggests that there is danger in offering simple causes for complex problems.

INTRODUCTION

It is indisputable that fewer students are enrolling in information technology (IT) courses in Australian universities. Numbers began to fall in 2001 and have been steadily decreasing with estimates indicating a fall of 25% per year (Philipson, 2005). This trend has alarmed both stakeholders within universities as they consider the ramifications of their changing circumstances and government sector leaders as the prospect of a future skills shortage is envisaged.

A number of reasons have been put forward to explain the trend of falling student numbers including Y2K fears, the public collapse of dotcom businesses, heightened HECS fees for IT degrees, and a perceived downturn in employment in the IT industry. The President of the Australian Computer Society (ACS), Edward Mandla, recently added to this list when he contended that the blame lies in how IT is taught in schools and how "bright young people … [are] turned off at school'" (Thorp, 2005).

This paper, while holistically a critique of the newspaper article from which the contention is taken, is written in direct response to the accusation of blame on schools. It is important to note that, given the fourth estate's propensity to misrepresent by selective reporting, this paper is in no way an attack on Mr Mandla but rather on the substance of the opinions attributed to him, and by association, to the ACS. The comments in this paper are founded on the belief that simple causality is dangerous and that what is offered as hypothesis may, with the familiarity of repetition, gain an undeserved credibility or "social proof" (Harris, 2000). What may follow are attempts to impose simplistic remedies – bandaid solutions – to problems that are deserving of a more thoughtful approach.

The article in question, published in *The Australian* on November 29, 2005, was cryptically entitled *No train no gain* (Thorp, 2005) and its prime purpose was to foreshadow a meeting of senior IT academics and ACS representatives being held in December, 2005. Edward Mandla described the attendees as "brilliant minds" and offered that the purpose of the meeting was to get them "thinking and talking" about the falling enrolments. The author, Diana Thorp, has let readers know that this is problematic through her sympathetic description of the university representatives as being "long-suffering."

The article includes the following emotive description:

> The plunging student interest is in stark contrast with the dotcom boom years, when technology faculties were flooded with school leavers and the hallowed halls heaved with students looking forward to a choice of job opportunities with fat salaries on graduation. That was before Y2K, the dotcom bust and the tech slump. As student interest has plummeted, the morale of IT academics has slumped and teaching jobs have disappeared.

If a reader can get past the alliterative illusion of heaving hallowed halls and the vertigo brought on by all that plunging, plummeting and slumping, the cited description could be visualised as a scene from a film. Images of enthusiastic tousled-haired fresh-faced undergraduates jostling in a hallway as they make their way to class could be interspersed with shots of IT academics bent over lecterns in the front of half-empty lecture theatres as melancholy music plays in the background. There is a profound nostalgia in Thorp's (2005) unnecessarily emotive recount of the situation. It cannot be denied, however, that there have been heady days in IT Faculties when

student numbers were high and it seemed improbable that things would ever change or, critically, that they could change so quickly. There has been real angst in IT faculties as staff have been "lost." There is a palpable pain as those interviewed in the article spoke of downsizing, retrenchments, redundancies, early retirements and natural attrition. These phrases describe real people losing their jobs and educational institutions losing expertise and corporate knowledge.

The body of the article under review is given over to 'sound bites' from Faculty Deans from Bond (Gary Marchant), UTS (David Wilson), Monash (John Rosenberg and Ron Weber), Swinburne (Doug Grant), QUT (Simon Kaplan) and ANU (John Richards). Each quite candidly offers the perspective of his university. It is of interest that none of the Deans interviewed proffered the same blame for falling enrolments on schools and teachers. It is not known, however, if any or all of them share this belief.

A careful reading of this 'sound bite' section reveals the deliberate, pragmatic, and often dramatic strategies universities have initiated in line with their stated determination not to "wait for a recovery" (Grant, Swinburne). It would seem that the question of viability has been pro-actively addressed as each IT Faculty comes to terms with operating with fewer resources. The strategies seem to fall into three clear categories. The first is closure or amalgamation as evidenced by the subsumption of the IT Faculty by the Faculty of Business at Bond University. The second is the reorientation of IT courses towards games development (Deakin University), multimedia and network management. Change is also on the agenda at Monash with Professor Rosenberg offering that "an information technology faculty purely based on computer science and information systems is doomed to failure." What was the norm before 2001 is now considered a prescription for extinction.

The third category is curricular and is evidenced where IT courses, as at QUT and ANU, have been restructured. A further category, not mentioned in the *No gain no train* article is administrative. In this, some universities have lowered student entry scores and, when this has had little impact, have limited course places (Philipson, 2005). Positive responses to the introduced changes are reported in the article but not emphasised. For instance, ANU's numbers are on the rise with its being "one of the few technology faculties to record an increase in the first preferences to study" and UTS "has maintained its target figures because it has created a combined technology-business degree."

The fall in numbers has not been even with Professor Wilson (UTS) describing "a mixed pattern of enrolments," particularly in regard to international enrolments. Professor Kaplan (QUT) noted that more students are undertaking double degrees, and this, coupled with the rise in participation in combined degrees, might indicate that there is still an interest in studying IT but that students are 'hedging their bets' in terms of later employability.

There is something indefinably admirable about the IT Deans' determination to deal with such an ill-defined foe. That this trend is an "international phenomenon" (Grant, Swinburne) and that a "recovery" will happen naturally has not led to a fatalism, or acceptance of what is presumed to be an inevitable cyclical industry downturn. Although unstated, it does not help that this problem has coincided with unprecedented financial pressure within universities as government regulations tighten and demands for heightened productivity are made.

IN DEFENCE OF SCHOOLS

The gravamen of *No gain no train* is, as previously noted, the contention that the fall in numbers, and presumably the predicted future skills shortage in IT professionals, can be blamed on schools. The text in question (in full, with numbers added to sentential bites for later discussion) is as follows:

Perhaps the turnoff is occurring before students even consider university. Mandla says problems with students and hi-tech start in schools.

"We don't teach surgery at school, we also don't teach court trial procedure at school, but for some reason that I can't work out we've decided to teach hi-tech as a profession in schools," he says.

"Hi-tech today is all about how to align processes to the business. Very few teachers are equipped or qualified to teach that."

Technology deans "can't even get a crack at these bright young people because they're turned off at school."

Next month's meeting will also look at whether schools should teach hi-tech, what is needed in courses, and how to get the government to help kick-start some much-needed graduate programs.

Most problematic in this text is the ill-defined term "hi-tech." When this is extrapolated (in Bite 2) into the notion of teaching "hi-tech as a profession in schools," it becomes even more difficult. Mr Mandla may have meant (a) the senior syllabuses in information technology which differ in each state and territory, (b) vocational or state-registered syllabuses, (c) VETEC Certificates I-III, taught as standalone entities or as companion or embedded units within syllabuses, (d)

CISCO Network Academy programs, or (e) Microsoft Practitioner programs. It is presumed that "hi-tech as a profession" does not refer to more generic or cross-curricular use of computers in schools as this would be in direct contradiction of the ACS ICT in Schools policy (ACS, 2005) published in October, 2005. It would be ironic if "hi-tech as a profession" meant VETEC or CISCO qualifications as these were put in place by education authorities to counter the social ill of youth unemployment.

Bite 1

In this context, the term "turnoff" is pejorative and colloquially implies deterrence or discouragement. It has a visceral and kinaesthetic sense as a person physically or metaphorically turns away in disgust. It is a particularly strong expression to use in this context. This 'turning off' must date back to 2001 when tertiary numbers began to fall. This begs the question if, in the heady days of high enrolments in 2000 and before, schools had been influential in turning students 'on' to IT courses and professions.

It seems reasonable, in the current context, to assume that the targets of the complaint are standalone senior secondary 'computing' subjects. These differ markedly between the states and are offered under a variety of names and with quite different teaching approaches. Bringing them together as one entity is not viable and where, in some states, these are not prerequisites for entry into IT degrees, the connection becomes even more tenuous.

The notion of "schools" as a holistic entity is also problematic as it assumes a national curriculum and standardised content. Schooling in Australia is under the purview of states and territories and there is no typical Australian school. If it were one state whose leading university had falling IT enrolments, then an accusatory finger could conceivably be pointed at that state's school syllabus, but when it is a national, nay, an international occurrence (see Anderson, Klein & Lankshear, 2005), then the finger pointing becomes a foolish gesture.

What is overlooked in this assignment of blame is that schooling is not a direct conduit into particular courses or careers. The lessons about 'portfolio careers' and flexible options have been learnt and senior secondary syllabuses are not written solely to prepare students for their tertiary equivalents. With higher retention rates, those aiming for university are now in the minority in Australian senior secondary classrooms.

Bite 2

The second bite in this sequence needs to be addressed in five sections.

Butcher, baker, soldier, sailor?

The analogy to surgery and court trial procedures is specious. The notion of being operated on or defended by a 17-year old school leaver is preposterous. Both activities require deep levels of knowledge and supervised experience to gain professional competence and neither profession is gained by merely acquiring an under-graduate qualification. Further study and formal professional registration through the Royal College of Surgeons or Bar associations are respectively required.

While not denying the need for knowledge and experience, it must be noted that IT is different to other professions because of its appeal to enthusiasts. We all know of young people, irrespective of formal training, building systems or writing software which are truly professional and commercially competitive. We have heard the apocryphal stories of corporations started by kids in garages and of teenage hackers employed as poacher-turned-gamekeepers by security agencies. While these are the exception rather than the rule, they are within the lived experience and understanding of many people. The number of popular publications and online support groups available which deal with information and communication technologies is testament to this broad appeal.

What an IT degree brings is a deepening and formalising of knowledge, expertise in a chosen specialisation, maturity, experience and the development of collaborative and team skills so critical in a successful IT professional. Gaining employment in the IT industry, however, is often evidence-based and candidates are encouraged to build a portfolio documenting their experience in differing computing environments. A school leaver may have the capacity, but is unlikely to have the depth or breadth to gain employment ahead of a university graduate. Interestingly, a recent advertisement (January 2006) for a database developer with ASIO specifically noted that formal IT qualifications were not required for selection and that experience would be regarded as equivalent.

Employ a teenager while they know everything

The implied suggestion in this bite is that students have gained sufficient IT qualifications at school to directly enter the workforce thus negating the need for tertiary study. The vocational push in schools which began in the 1980s has neither eradicated youth unemployment nor overtly affected university enrolments. It is, however, a viable way for schools to deliver authentic programs and to engage students who might, in past times, not have continued at school. There is strong advocacy for vocational education in schools by governments at all levels and Industry Boards across Australia. There is a broad base of literature and research into the area.

Personal perspective

The clause "but for some reason that I can't work out" needs examining. It is less an indication of personal opinion or admission of a lack of understanding than it is of ridicule. The intention of this clause is dismissive inferring that school curricula are designed without reason or due concern for social needs.

A subliminal polarity has been created in the article between the "brilliance" of the academics and ACS representatives and the alluded paucity of competence and experience of school teachers. This clause consolidates this notion

extending its accusation of incompetence to curriculum planners and education authorities.

Us and them

The object of the previous expression is "we've decided to teach hi-tech as a profession in schools." Here the pronoun "we" is used to distance the speaker from the "I" of the previous statement. This is a textual device used to isolate the action and cast the speaker into the role of external expert critic and to abnegate responsibility for action.

Hi-tech as a profession in schools

The reference to "hi-tech as a profession in schools" has been previously questioned in this paper. Although outside the scope of this discussion, it is useful to briefly consider how "hi-tech" is used in Australian schools. A comprehensive national study commissioned by Department of Education, Science and Training (Downes et al., 2002) identified five types of use which are:

Type A: Encouraging the acquisition of ICT skills as an end in themselves

Type B: Using ICT to enhance students' abilities within the existing curriculum

Type C: Introducing ICT as an integral component of broader curriculum reforms that are changing how learning occurs but also what is learned

Type D: Introducing ICT as an integral component of the reforms that alter the organisation and structure of schooling itself

That all students become confident, creative and productive users of ICT is a national goal of schooling in Australia (MCEETYA, 1999) and the federal government has initiated national testing of students' ICT literacies. National statements on ICT in schools are to be released in 2006 and are to be embedded within all school syllabuses. "Hi-tech" is pervasive in schools but not as "a profession."

Bite 3

The claim that teachers are ill-equipped and unqualified is merely name-calling. The question is perhaps not so much whether or not teachers can teach IT as related to business goals as to ask why this is necessary. Assumptions are made which presume that schools and universities share the same goals in relation to technology. Schools, as noted in the listed typologies (Downes et al., 2001) are more concerned with teaching with and through technology as they are with teaching about it.

While efforts are made to make learning and assessment authentic, IT syllabuses in schools are generally concerned with generic problem-solving and higher-order thinking in an IT context. Where teachers are required to make the connection to Business, that is, through the teaching of VET Certificates, then their own and their school's capacity to do so is audited by the appropriate authorities. Many teachers are both equipped and amply qualified to fulfil this responsibility. There are vacancies for IT teachers and, although arguably less glamorous than 'corporate' IT, it is a viable option for IT graduates

Should the claim of limited expertise have substance, then the ACS could take a role in redressing this. It, and the senior academics who form part of its membership, could follow the lead of Professor Kaplan (QUT) who has actively engaged with the state professional association and arranged professional development events for classroom teachers. This is likely to achieve a more productive outcome than empty accusations of blame.

Bite 4

The sexual connotations of the vernacular term "get a crack at" (and the previously used "turnoff") add another dimension to the suggested polarities between the professions and schools. At best, the term 'get a crack at' implies a somewhat unseemly enthusiasm which has little to do with the reality of university studies. It would be interesting to hear what the 'Technology deans' thought of its usage in this context.

The term 'bright young people' in the fourth bite is also problematic. The notion of intelligence is again raised – despite some universities lowering their entrance scores - and a further allusion made to the distance between students and their plebeian unqualified teachers. There is a Hansel and Gretel story proposed here of 'bright young people' being held back by evil intent. The 'Technology deans' are the heroic protagonists, who, if only they could release Hansel and Gretel from this dire situation, could make the world a better place.

Before blame is simplistically levelled at schools and teachers, then it should be ascertained how many students come to IT courses in university directly from school. Who is studying IT in Australian universities? Are they school leavers? The answer is that they are more likely to be international and mature-age students and less likely to be female - 'bright young people' usually means 'bright young men' - or from Indigenous backgrounds. The movie scene described earlier of "enthusiastic tousled-haired fresh-faced undergraduates" is more likely to call a cast of Asian and older Australian actors, that is, it is more likely to star Bryan Brown than Heath Ledger.

The combination of reduced numbers of international students (see Illing, 2005) and students opting for

double or combined degrees must be contributing factors to the overall fall in IT enrolments but, interestingly, these are not included in Mr Mandla's hypothesis. It may be that these falls have simply brought the lower numbers of school leavers into focus. While overall numbers were high, faculties had little cause to stop and consider school leavers or other under-represented groups.

A rival hypothesis could be raised which conjectures that it is universities themselves which are turning students "off." Students' lowered confidence could be based on perceptions of what happens inside such courses. It might be useful to look at university track records in regard to IT degrees and ask what are their failure and dropout rates, retention rates (particularly of female students) and the time taken to complete degrees. What have students been saying in Course Evaluation Questionnaires (CEQ) collected by federal authorities? How effective is the teaching in these faculties? The article cites Mr Mandla's criticism of IT degrees particularly in their emphasising programming and overlooking security, emerging technologies and what he called "soft skills." In their defence, Professor Grant (Swinburne) offered that the problem has "little to do with the curricula being offered." While universities may be complicit in the fall in student numbers, it is easier and more comfortable to 'other' problems, that is, to project their cause onto outside agencies or factors.

Bite 5

The final bite offers that the meeting (here personified) will "look at" the following:

- whether schools should teach hi-tech
- what is needed in courses, and
- how to get the government to help kick-start some much-needed graduate programs.

Over time, a number of interest groups have tried to influence what is taught in school. With respect, there is no evidence to suggest that the ACS or the Deans of IT Faculties have any greater claim to such influence than, say, the fundamental religious groups advocating the teaching of intelligent design. Universities were once highly influential in determining school curricula and, in some states, had the responsibility of setting public matriculation exams. Those days are gone and will not return. The group of 'brilliant minds' called to the ACS meeting, despite their eminence, do not have the power, or arguably the right, to interfere with school curricula.

As the focus was education, one wonders why, when convening the meeting, the ACS did not invite Deans of the Faculties of Education or representatives from the national teacher professional association, Australian Council for Computers in Education (ACCE). There is a Computer Education Group in each Australian state and territory and representatives could similarly have been drawn from these groups. As it stands, the defendant has no defence. The prosecution, despite a reliance on hearsay or isolated personal experience, is unchallenged. The inclusion of the Deans of Education would seem obvious as it is their graduates whose capacity and competence is being impugned.

The third agenda item concerns federal or state support. Such support seems, however, to be pending. For instance, the Premier of Queensland, Peter Beattie, recently announced a 2006 summit to investigate the issue of falling IT enrolments and its concomitant future skills shortage (Sate of Queensland, 2005).

This final bite seems innocuous but masks uninvited intervention into how IT is taught in schools. There is evidence, however, to doubt that the agenda has, in fact, been accurately reported. Elsewhere in the article the purpose of the meeting was said to be to "help the … [ACS] formulate its higher education policy and understand what is going on in the universities" and "to get a bunch of senior academics around the table with Edward [Mandla] and others from the society to brainstorm ideas we might be able to put into practice" (Grant, Swinburne). The blame on schools is somewhat presumptuous given that the brainstorming, at time of the article's publication, had not been held.

CONCLUSION

The purpose of this article has been to challenge, and hopefully dismiss, accusations that the fall in tertiary IT enrolments is the fault of Australian teachers and the way that IT, "hi-tech," is taught in schools. There is danger in any simple explanation of complex situations and, in this instance, it comes, with the status of the ACS, from the potential of this accusation to impact on schools. The recent and unexpected notice that (VET) Certificate III in IT cannot be taught in school (February 2006) may be an outcome of lobbying and the promotion of such simplistic notions.

It is difficult to accept the accusation when it becomes clear that the problem is international, that is, occurring in places where the deleterious effects of poor Australian teaching and uniformed curricular decisions could not be felt. It is similarly difficult to accept a simple cause and effect within Australia where schooling is controlled by states and territories and there is no standardised content or approach in IT subjects. The accusation is, above all, remarkable in its exclusion of salient factors such as the changing public perception of the IT industry and its singular focus on a presumably 'soft' target.

The irony is that there are indications of a resurgence in the IT industry and a renewed interest in graduate employment as drastic measures are being taken in universities. Like a receding tide revealing the rusting hulk of a shipwreck, the fall in student numbers may have simply revealed the low numbers of school leavers entering IT degrees. Hopefully, once a recovery has been achieved, the current attention on the under-represented groups within IT cohorts is not forgotten.

BIOGRAPHY

Dr Margaret Lloyd is a Senior Lecturer in the Faculty of Education, QUT. While she lectures in a number of areas in computer education, she has specific responsibility for secondary computing curriculum studies. She is on the State Review Panel for Information Processing and Technology and is a member of the Queensland Studies Authority's P-12 Technologies Committee. She was part of the writing team of the Information and Communication Technology Education (ICTE) syllabus and has co-authored an ICT textbook for junior secondary students. Her current research interests include the history and politics of computer education, the measurement of integration of ICT in the classroom, and the definition of effective professional development for teachers. MicroWorlds and Learning in Teacher Education

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