

An IT degree combining the strengths of University and TAFE

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Abstract

As a partnership of University and TAFE, the Ourimbah Campus of the University of Newcastle is ideally placed to take advantage of the best that each sector has to offer. The new Applied Information Technology degree is unusual in two respects: first, students' programs are constrained to consist of half IT and half some other discipline; and second, almost two-thirds of the IT is provided directly by TAFE NSW, a provider of Vocational Educational Training. The latter feature has provoked renewed consideration of the different roles of TAFE and University in IT education.

Keywords: University education, vocational training.

1 Introduction

1.1 A cross-disciplinary degree

A great number of IT academics began their work in another discipline. Many others began by studying a generalist degree that included IT as one of two or more disciplines. Yet the traditional computing degree in Australia consists of a great deal of computing, a little mathematics, and some freedom to extend the study into other disciplines. An example is the University of Newcastle's Bachelor of Computer Science (The University of Newcastle 2002).

There is a significant shift taking place, though. 'As IT is used as a driving force to enhance and transform work practices in most sectors, it becomes more necessary to provide graduates with other skills besides highly technical computing skills. They need to learn how to make best use of IT by applying it to practical problems and effectively integrating it into the working environment, be that law, business, mining, or tourism' (Pham 1997).

The shift is in part a response to employers from other disciplines, who want graduates capable in both IT and their discipline; and in part a response to employers in general, who are increasingly viewing a second discipline as evidence that the graduate has a well-rounded computer education. The 1999 IT&T Skills Taskforce

reported, for example, that 'Business and other non-technical skills are considered desirable or necessary by an overwhelming number of IT&T employers but are difficult to find' (National Office for the Information Economy 1999).

One expression of the shift is at subject level, with the creation of subjects intended to bridge the gap between computing and one or more other disciplines. An example is the third-year subject in Technology Management offered at Macquarie University (McGrath and Offen 1998).

Another expression of the shift is at degree level. Many degrees created or reviewed in the past few years have emphasised the extension into other disciplines, often permitting or even encouraging students to combine a second major with their computing. An example is the University of Newcastle's recently reviewed Bachelor of Information Science (The University of Newcastle 2002). And of course there are numerous general degrees in science, arts, and other areas that permit the choice of an IT major.

The University of Newcastle's new Bachelor of Applied Information Technology degree (BAppIT) goes further than this, however, by making a second discipline an integral and inescapable part of the degree. The degree emphasises the application of IT to the other discipline, and is designed to complement the University's existing degrees.

The degree normally consists of 24 subjects, eight in each of three years. Thirteen of these subjects must be IT subjects; nine must be in some other discipline; and the remaining two are elective. The degree thus has two majors, one in IT and one in a second discipline. Students do not have the option of studying more IT for their second major – they are constrained to study in another discipline. We are not aware of any other IT degree in Australia with such a constraint.

1.2 A cross-sectoral degree

A second interesting feature of the degree is that of the thirteen IT subjects, five are taught by the University and eight by TAFE NSW (see section 4). The University designed these latter subjects by selecting groups of existing TAFE modules, often in combinations new to TAFE, that combine to make reasonable equivalents to university subjects.

This arrangement arises in part from the nature of the Ourimbah Campus, which is a strong and vibrant partnership of the University of Newcastle, the Hunter

Institute of TAFE NSW, and the Central Coast Community College.

The campus facilities are equally available to all three partners, and TAFE and University staff share the same office buildings and teaching spaces. This close working relationship, together with the comfortably small campus population, has fuelled a strong interest in collaborative ventures, of which the BAppIT is a recent example.

We are not the first to incorporate TAFE study into an IT degree. For example, Southern Cross University's Bachelor of Applied Computing (Southern Cross University 2002) consists of three semesters of University IT study designed to follow a TAFE IT diploma for which three semesters of credit is given. But we believe that we are the first to combine this cross-sectoral approach with the cross-disciplinary approach of two distinct majors, and we are quite confident that we are the first to outsource a large number of individual subjects to TAFE within the framework of the University's timetable and with the University maintaining control over the syllabus.

2 Who enrolls in the degree?

The University of Newcastle can lay claim to some prestige among regional Universities in Australia, but in the eyes of many prospective students it does not rank with the major metropolitan universities.

The Ourimbah Campus of the University, established only ten years ago in an economically depressed region, ranks still lower among school leavers.

Few would question that university entrance scores are determined by demand rather than by what they might indicate about academic rigour and a student's chance of success. Therefore the entrance requirement for the BAppIT is at the low end for computing degrees in general and even for computing degrees at the University of Newcastle.

Students for whom the BAppIT is first choice are in a minority, albeit a sizeable one. They tend to choose the Ourimbah Campus because of its geographical proximity to their homes.

The bulk of BAppIT students come to the degree as a second or further choice, having failed to gain entry to the degrees they wanted at the institutions they wanted. This group includes a significant number of students from Sydney, the northern reaches of which are about an hour away by car or train.

The majority of students in each BAppIT intake choose the degree not because of its special features but because it is the only IT degree in which they are offered a place.

These factors will clearly have significant effects on student motivation and outcomes.

3 Complementary majors

Broadly speaking, the second major of the degree can be in any discipline offered to sufficient depth on the Ourimbah Campus, giving students a broad choice across

the areas of business, humanities, and science. In 2002, complementary majors are offered in the following disciplines:

- Aboriginal welfare
- accounting
- Australian and Asia-Pacific studies
- chemistry
- childhood and youth studies
- coastal zone management
- creative arts
- digital visual media
- entrepreneurship
- education
- fine art
- food technology & human nutrition
- general business
- general science
- gender studies
- government and society
- hotel management
- human resource management
- literature and performance
- marketing
- natural resource management
- societies and cultures
- sport and club management
- welfare studies

In most cases where there is a relevant professional body, these majors satisfy the accreditation requirements of that body; in one or two cases, for example accounting, additional study might be required to attain this goal.

There is not an even spread of students across these complementary majors. The various business majors attract the greatest numbers, with education, digital visual media, and natural resource management also attracting reasonable cohorts.

4 The VET sector and TAFE NSW

4.1 What is TAFE NSW?

Technical and Further Education New South Wales (TAFE) is a state-run educator in the Vocational Educational Training (VET) sector.

TAFE runs certificate and diploma courses, each of which is designed to take one or two semesters full-time. In information technology, the Certificate level II (formerly Certificate level III) is the broadly scoped one-semester entry-level qualification. This can be followed by one of several two-semester Certificates level IV, which specialise in different areas such as programming, IT administration, multimedia, and network support. Having completed a Certificate level IV, students can enrol in a one-semester Diploma that consists principally

of a major project. One typical two-year program would consist of the Certificate level II, Certificate level IV in Programming, and Diploma in Software Development.

VET courses are generally required to adhere to state or national syllabuses or outcomes. The current form of this requirement is the set of National Training Standards, which specify minimal competencies to be met by people completing the courses. Before the competencies were introduced several years ago, each qualification was defined as a set of fixed modules of different sizes, most of them significantly smaller than a university subject.

VET teaching generally involves smaller classes and more hands-on experience than university classes in similar subjects. While a university subject will typically be taught with lectures to the full class followed by labs or tutorials for groups of 20 or so students, all VET teaching takes place in classes of 20 or so students. Each class is like a combined lecture and tutorial, and there is no analogue of the university lecture.

4.2 Differences between TAFE and university

There are at least two different perceptions about the distinction between VET and university outcomes in the same discipline.

One perception is that VET courses are at a lower level than university courses, teaching less material and producing less capable practitioners.

A second perception is that VET courses are narrower and more specialised, producing people trained to do a particular job, while university courses are seen as broader, producing well-rounded people capable of undertaking a variety of occupations within their chosen discipline.

We believe that the first perception is valid in some discipline areas and the second in others, including IT. We see TAFE IT diplomates as being well trained in their particular specialisation, and probably more knowledgeable in that specialisation than a typical university graduate. We see university IT graduates as being capable across a broader range of specialisations, with knowledge extending beyond IT into related and sometimes unrelated areas.

We do not see the IT education of TAFE as inferior to that of university; rather, we see it as narrower in focus, more specialised, and more goal-oriented.

It has been suggested, for example by one of the referees of this paper (208d 2002), that 'the competency-based approach of TAFE does not prepare [students] for the very different style of learning and assessment at university. They do not adjust well to problem solving, group work, or major projects.'

4.3 Drawing on the strengths of both

Guided by these views, we have given the BAppIT a TAFE component that is broader than TAFE's certificates or diplomas. The coverage in these subjects is necessarily shallower than in the TAFE qualifications from which

they are drawn, but goes straight to the most challenging part of each topic.

To this we have added a university component that builds on and complements that breadth.

5 The University IT contribution

Most of the University's teaching in the BAppIT is reserved for the third year, although the university does teach an introductory overview IT subject in the first year of the degree.

The final year is intended to broaden the students' scope and enhance their critical and analytical skills. In this year, too, they undertake a major group project, in most cases one that combines IT with the discipline of their other major.

The subjects taught at third year are Contemporary Issues in IT, Advanced Software Development, IT Applications, and IT Project.

The University IT staff are also heavily involved in the creation and tuning of the IT subjects taught by TAFE. The degree was designed by the University, in consultation with TAFE staff, and the University continues to specify its requirements in the TAFE subjects.

It is through this requirements specification, and through the design of its third-year subjects, that the University offsets any anticipated shortcomings of the TAFE part of the degree.

6 The TAFE IT contribution

In the first instance the eight TAFE subjects were created as collections of modules already offered on this campus, principally from level IV certificates. They have now been redefined to reflect the current competencies, with little alteration to their subject matter.

The subjects were chosen to reflect the sort of topics that are generally taught in IT degrees; and within those subjects the modules were chosen to give the sort of broad coverage typical of a university subject, as opposed to the deep specialisation of a TAFE certificate or diploma.

The eight TAFE subjects are

- Computer Systems Management
- Web Site Construction
- Systems Analysis & Design
- Applications Programming 1
- Applications Programming 2
- Operating Systems
- Computer Networks
- Database Management Systems

In terms of implementation, the university outsources these subjects to TAFE. The students enrol as they would for any other university subject and the university pays TAFE an agreed amount for each student enrolled.

The subjects are timetabled by the university, as are their exams. Students pay the standard HECS charge for each subject. The University pays close attention to the syllabus, and marks are finalised at a meeting of relevant TAFE and University academics before being submitted as university results.

While TAFE has modified its subject matter and its teaching schedule to tie in with the University's subject design and the University's timetable, in most other respects its subjects are taught as VET subjects, with the small classes and hands-on approach that this entails.

7 Advantages to students, employers, and the institutions

The clear and obvious advantage of this degree to both the University and TAFE is the creation, through close collaboration, of a qualification that draws on the combined strengths of both institutions.

The principal advantage of the degree to employers is its cross-disciplinary nature. Employers in many non-IT disciplines are expressing a clear requirement for graduates in those disciplines who also have good IT skills; this degree provides such graduates.

Even within the IT discipline, employers have long realised that pure IT graduates, whether from the VET sector or the university sector, are often sorely lacking in social skills, communication skills, client interaction skills, and so on. These employers too, have begun to appreciate that graduates whose education goes beyond IT are more likely to possess those skills.

To the student, then, the first advantage of the BAppIT is often the enhanced employability that it offers. But the second major is also proving remarkably popular in itself, with students realising that they can combine their study in IT with study in another discipline that they find equally appealing, such as fine art or natural resource management.

Even when students enrol in the mistaken belief that the BAppIT entails nothing but IT, a consequence of the fact that the degree is not the first choice of many students, they quickly come to appreciate the value of being able to incorporate another discipline.

The small-class teaching is a further advantage to the student. Those who might be cowed in a big lecture appear to benefit greatly from the small classes, the personal teaching, and the hands-on practical approach. The following unsolicited letter from a student addresses exactly this issue.

'I am writing to congratulate you on developing a learning environment that encourages you to learn. I came from the [Newcastle] Campus where you are taught in lecture theatres with a couple of hundred other students. This is not a good environment to learn, especially for Software Engineering. It doesn't encourage you to ask questions which I feel is essential to get a good understanding for a particular subject.'

'The [Ourimbah] Campus in contrast is totally the opposite; we have small classes and hands on practical

experience. The whole concept of combining University and TAFE is fantastic. I have friends in the industry that tell me to get a job you need TAFE practical experience and a University Degree. I feel at the [Ourimbah] Campus with the BAppIT degree I am getting both. I have friends considering studying computing at University and I try to encourage them to come here because I think the BAppIT degree offers so much more than other degrees. So thank you for designing a course that provides us encouragement to learn and the necessary knowledge for our later working lives.' (Satchell 2002)

8 Pathways in, out, and through

One of the expressed intentions during the degree's design phase was to allow multiple entry and exit points: to permit students at various stages of TAFE qualifications to convert seamlessly to the degree, and vice versa.

This is not as straightforward as it seems, because the TAFE-taught subjects were chosen deliberately to provide a broad overview of IT as opposed to the deep specialisation of a TAFE certificate or diploma.

Although the eight TAFE-taught subjects are equivalent in workload to a certificate level IV, they do not correspond in content to any of the existing certificates. Indeed, they are drawn from at least four different certificates, covering none of them completely. Therefore a student withdrawing from the degree after completing these subjects would have to undertake significant further study to qualify for the award of a certificate.

The case in the other direction is a little more straightforward. For the same reasons as explained above, a current TAFE diplomate has not covered the breadth of TAFE material incorporated into the degree. But the University has some freedom, by way of its articulation arrangements, to stipulate what credit will be granted to entrants with what qualifications.

While applications for articulation are considered on a case-by-case basis, the general expectation is that TAFE diplomates will be granted credit for the introductory university subject and all eight TAFE subjects, except that those whose studies had not included programming would be expected to undertake the programming subjects. Further credit, to a maximum of 12 subjects, would cover the three elective subjects. Entrants from TAFE are unlikely to be granted credit for any of the third-year level university subjects.

An interesting consequence of these arrangements is that students who would prefer TAFE's narrow specialisation to the University's broad overview need only enrol in the TAFE qualifications of their choice, then apply for articulation when ready.

Indeed, one of the design goals of the degree was to extend the IT knowledge of TAFE diplomates while at the same time broadening their overall education.

The degree also provides a useful pathway to students with degrees in other disciplines who now wish to qualify in IT. On the basis of their existing degrees they are

usually granted credit for the whole of the complementary major and the electives, and have only to complete the IT major to qualify for the award of a BAppIT.

9 Problems past and present

The design and implementation of the BAppIT have not been entirely free of problems, but both the University and the Institute have proved more than willing to address these problems quickly and efficiently.

When the course began, students had to enrol with TAFE for its subjects and with the University for the others. This led to a number of problems, and the arrangement has been replaced by a simpler one in which all enrolment is directly through the University.

Another problem is that, because it was designed to address employer requests for IT graduates with broader skills, the degree cannot serve the potential market of TAFE diplomates who want to convert their qualifications to a degree by studying more IT at university level. When told that the bulk of their university study would be in a non-IT discipline, some such people turn to other universities whose degrees better meet their requirements.

A more challenging problem stems from the fact that the TAFE subjects are typically chosen from level IV certificates. The teachers are accustomed to teaching this material to TAFE students with one or more semesters of full-time IT under their belts, and have had some difficulty reworking it for university students in their first or second semester of part-time IT.

By the same token, the TAFE teachers are somewhat dismayed at the failure rates in some of the early courses. Within the TAFE system, courses at this level are taught to students who have already shown some propensity for IT study, and would seldom have a dropout/failure rate as high as 10%. In the degree, on the other hand, the teachers are faced with beginning students who have no knowledge of their aptitude for the work. In its second offering, in 2001, the introductory programming subject lost some 30% of its students during the semester, and saw another 30% fail.

While this sort of dropout/failure rate might appear alarmingly high, it is not entirely unexpected given the low entry requirement to the degree. The introductory programming subject at the University's main campus, which is taught to students from a number of degrees, tends to lose some 30% to withdrawal or failure. This rate shows a loose correlation with the degree being undertaken. Degrees in which programming is perceived as incidental, and which have somewhat lower entry requirements, have a higher failure rate than those in which programming is integral and whose entry requirements are higher.

Programming is hardly incidental to the BAppIT (although some students wish it were). Nevertheless, it would appear that the low entry requirement leads to the admission of some students for whom the work is going to be a great struggle.

10 The steady state

The BAppIT, which had its first intake in 2000, is now settling into a reasonable steady state.

The TAFE-taught subjects were refined after their first offering, as would be expected for any new subject.

The third-year subjects taught by the university have been designed to complement the TAFE subjects while offering the greater breadth and maturity that tend to be associated with university study.

The IT component of the degree was designed to meet the Australian Computer Society's Core Body of Knowledge for Information Technology Professionals (Underwood 1997), and, where appropriate, the complementary majors were chosen to meet the corresponding requirements of their own professional bodies. It was therefore no surprise that the degree was accredited by the ACS, and its non-IT majors credited by their relevant professional bodies where appropriate.

The steady-state annual intake of students is about 60, and there are no expectations of local growth in the current tertiary education climate.

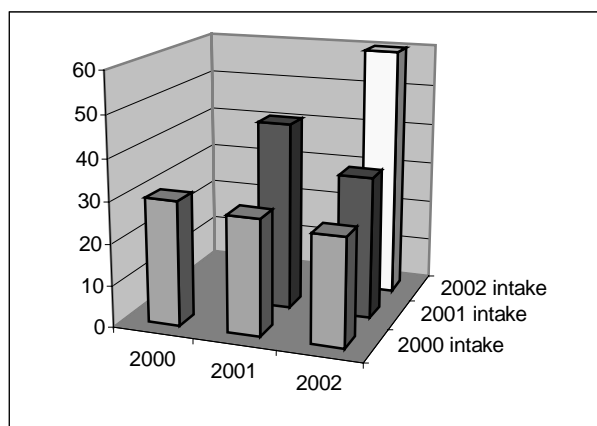


Figure 1: student numbers in BAppIT

There has, however, been some interest in extending the model to non-local campuses. Within Australia, that entails dealing with different institutes of TAFE NSW or comparable institutions. Offshore, it entails dealing with different institutions altogether. Current expectations are that two such extensions within Australia and one offshore will start in 2003.

As some of the first intake of students finish their undergraduate study, it is possible to make some qualitative judgements on their employment prospects.

A handful of students have already been snapped up into IT help-desk positions in the region, and have consequently dropped back to part-time study.

While it is too early to be definitive, the prospects for the graduating students appear normal. Some are planning to proceed to honours, some have full-time work lined up, and the rest are still looking, but with confidence.

11 Conclusion

The Bachelor of Applied Information Technology is unusual in its obligatory combining of IT with a second discipline; is unusual in the fact that one third of the degree, nearly two thirds of the IT, is TAFE material taught entirely by TAFE; and is probably unique in its combination of these two features.

The BAppIT is an extremely robust degree that has proved popular with students, and that we expect will prove popular with employers. We believe that a degree with this much synergy could not have been created or implemented nearly so readily except on a joint campus such as ours.

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