The Impact of Australian Legislation Upon an IT Degree: Considerations and Response

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ABSTRACT

In Australia, all recent higher education reforms have been driven by new legislation detailed in The Higher Education Support Act (HESA) 2003 that mandates and regulates the conditions under which tertiary institutions are able to be run and funded. In anticipation of the HESA enactment, Victoria University in Melbourne, Australia, conducted an institutional wide assessment of the University's position regarding HESA compliance and found that the University needed to rationalise course structures and progression rules, including standardization of subject sizes (Lister Review, 2003). This paper reports upon the adoption of a uniform system of subject size and associated credit points has necessitated a major course review of our Information Technology undergraduate program. This review, which posed a number of challenges at both School and inter-faculty levels, was informed by the needs of the stakeholders: the University, academics, the Australian Computer Society, industry and students. An insight into issues of importance on the IT curriculum is discussed before arrival at a HESA compliance program for our degree.

INTRODUCTION

In Australia, all recent higher education reforms have been driven by new legislation detailed in The Higher Education Support Act (HESA) 2003 that mandates and regulates the conditions under which tertiary institutions are able to be run and funded. In anticipation of the HESA enactment on 1 January 2005, Victoria University in Melbourne, Australia commissioned a taskforce to conduct an institutional wide assessment of the University's position regarding HESA compliance or otherwise. After an examination of all university course offerings, a major recommendation of the review obligated that *"the University rationalise course structures and progression rules, including the standardisation of subject sizes"* (Lister Review, 2003, Recommendation 17).

In 2004, an audit undertaken on the range of subject sizes and their credit point allocations in operation at the University highlighted disturbing anomalies. The investigation found a broad spectrum of unit sizes with differing credit point values ranging from 2 to 20 points and it exposed inequalities for different student majors in that the same unit of study could be awarded different credit point values dependent upon the program where the unit was undertaken. This audit underlined the need for the creation of a fair and equitable credit point system that would be accurate and consistent for all undergraduate and postgraduate courses. In addition, such a structure would ensure equitable course fee arrangements across the University's offerings and it would provide a transparency intelligible to students, staff and the community (Lister Taskforce, 2004a).

Through its Academic Board, the University instructed a working party to describe a uniform structure and a framework for a more suitable credit point system. The working party was also tasked with drafting a policy, entitled "The Credit Point System" for implementation by faculties. Subsequently, the Academic Board, at its June 2004 meeting, approved the introduction of the proposed new credit point system and the adoption policy that needed to be fully operational and HESA compliant by January 2006 (Lister Taskforce, 2004b).

Charged with implementing the new policy, individual faculties needed to align their existing courses with the new credit point arrangements. The Faculty of Health, Engineering and Science devolved the responsibility for the revision of the undergraduate Information Technology (IT) degree program to the School of Computer Science and Mathematics, where it underwent an extensive academic review. This paper describes the new credit point system and the impact of its implementation upon the IT degree program offering at Victoria University. By examining the needs and considerations of the respective stakeholders, the paper offers an insight into the process of arriving at a HESA compliant program which meets the statutory requirements and has academic and educational merits.

HISTORICAL BACKGROUND

Prior to 2006, the undergraduate Information Technology (IT) degree was a three year full time program, comprised of six study semesters. In the first year, students were introduced to core subjects in IT that laid a foundation of computing technology and these units included hardware, software, mathematics and statistics. The second and third year curriculum comprised both core and electives, which allowed student flexibility to pursue their particular strengths and interests. A

Table 1. IT program structure at Victoria University prior to HESA

Unit of study		Year	Semester	
Year 1				
SCM1311	Programming 1	1	1	15
SCM1312	Programming 2	1	2	15
SCM1114	Introduction to Computing & the Internet	1	1	15
SCM1115	Computer Systems and Architecture	1	2	15
SCM1613	Applied Statistics 1	1	1	15
ACE1141	English Language & Communication 1	1	1	7
ACE1142	English Language & Communication 2	1	2	8
OR SCM1614	(For those not doing ACE1141 and ACE1142): Applied Statistics 2	1	2	15
SCM1711	Mathematical Foundations 1	1	1	15
SCM1712	Mathematical Foundations 2	1	2	15
Year 2				
SCM2211	Database Systems 1	2	1	12
SCM2311	Object Oriented Programming 1	2	1	12
SCM2312	Software Engineering	2	1	12
	Two electives	2	1	24
SCM2111	Data Communications and Networks 1	2	2	12
SCM2112	Operating Systems	2	2	12
SCM2218	Database Systems 2	2	2	12
SCM2313	Software Development	2	2	12
	One elective	2	2	12
Year 3				
SCM3001	Project 1	3	1	12
ACE3143	English Language & Communication 3	3	1	12
SCM3112	User Interface Design	3	1	12
SCM3314	Object Oriented Analysis and Design	3	1	12
	One elective	3	1	12
SCM3002	Project 2	3	2	12
ACE3144	English Language & Communication 4	3	2	12
SCM3312	Intelligent Systems	3	2	12
SCM3313	Software Engineering 2	3	2	12
	One elective	3	2	12

significant part of the degree was an industry based project spanning two semesters in the final year of study; regarded as a 'dress rehearsal' for IT students about to graduate and face the needs of the commercial world. To develop the necessary advanced written and oral communication skills for successful completion of the Project, students must undertake two mandatory co-requisite units in English Language and Communication. A detailed pre-HESA compliant course structure is shown in Table 1.

A quick inspection of Table 1 illustrates that the pre-HESA IT degree program was comprised of units of varying credit points. However a less obvious anomaly is that dependent upon their English language proficiency, students needed to complete either 28 or 29 units of study for their degree program. Those lacking in English language skills were required to undertake two enabling English language subjects valued at 8 and 7 credit points each, whilst proficient language students were enrolled in a single 15 point elective instead. All first year students enrolled in the remaining core units, which carried 15 credit points each. In the second and third year of the program all units to be undertaken were valued at 12 credit points each. So a typical fulltime student carried 4 units of study per semester in the first year and 5 units in each subsequent semester, which summed to 360 credit points over their undergraduate degree.

THE NEW CREDIT POINT MODEL AND POLICY

To be HESA compliant, all University programs were expected to adopt a 48 credit points per semester model for fulltime study; typically comprised of 4 units of study, each assigned a 12 credit points (cp) value. This standard model is known as the 4 * 12 model. The model further stipulated that 1 cp represented an average student workload of approximately 1 hour per week over a standard 12 week semester. It was hoped that the adoption of a standard system of credit points throughout the University would remove the anomalies identified by the audit process and ensure equitable course fee arrangements across the University's offerings. In addition, the model allowed for a more systematic approach to course planning in relation to student workloads. It was deemed that a full-time student would accrue 96 credit points (2 * 4 * 12 cp) yearly over two semesters and that 96 cp equated to 1.0 equivalent fulltime student load for measurement of funding by the Australian government. As such, the model provided a transparency intelligible to the government and the University and at the same time, the model enabled students to make more realistic planning in their studies (Lister Taskforce, 2004a).

The policy document entitled "The Credit Point System" outlined the framework for converting all existing programs in the University to the 4 * 12 model in two sequenced steps. Step 1 required that each respective course of study be identified as one of three types of amendments and Step 2 involved carrying out the amendment by revision of the entire course structure under the new model.

For Step 1, all existing programs were classified as one of the following three types of amendment: Type 1- Arithmetic Amendment that related to courses of study which involved no structural change (a mere arithmetic change to the standard 12 cp for each unit of study); Type 2- Minimal Structural Amendment that related to courses of study which required a minimal structural amendment (no more than 20% change); Type 3- Major Structural Amendment that related to courses of study which required a major reconfiguration (more than 20% change). Following which, Step 2 involved the preparation and submission of the full course credit point conversion document to be subsequently approved by the Faculty Course Approvals Committee, Faculty Board of Studies and the University's Academic Board.

CONSIDERATIONS FOR IMPLEMENTATION

So how could the 'decree' of the new (4 * 12 cp) program model be implemented in the undergraduate IT degree by the School of Computer Science and Mathematics? Examination of the pre-HESA IT program described above, revealed inconsistencies in the number of units for different year levels within the degree. As well, there was no uniformity in the unit values within and across year levels. In fact, the total number of units for the awarding of the degree was dependent upon a student's language proficiency!

For the School of Computer Science and Mathematics, the imposition of HESA compliance dictated an interruption to the timing of regular four yearly course reviews. However, in line with the prescribed steps, several course review meetings were held during late 2004 to nominate the category of amendment for revision of the IT program. These meetings identified that a Type 2 amendment would be the most appropriate since a fulltime second and third year load comprised of 5 units of study per semester (5 * 12 cp), thereby simplifying the retrofitting of the existing degree structure to the new standard 4 * 12 model. Further the first year could, with some readjustment, be aligned with the model.

For the course review committee, this identification of amendment type was a relatively simple task. However, implementing the amendment for Step 2 was a lengthy and complicated process. Retrofitting the existing course structure to incorporate the new 4 * 12 model credit point system posed a number of challenges at both School and inter-faculty levels. Some issues considered in this conversion exercise included questions like:

- How would the proposed changes maintain or enhance the educational outcomes of the course?
- Would the modification impact on the taught load of another School or Faculty?
- What would be the validity and relevance of the new course mapping to the various stakeholders (the University, academics, professional bodies, industry and students)?
- And how could the needs of the key stakeholders in the process be taken into consideration?

STAKEHOLDERS' NEEDS

a) The University

HESA compliance meant that all higher education units of study in Australia are assigned a credit point value, being a measure of the proportion of the year's workload that the subject represents to a student. Additionally, within a university, a unit must carry the same credit point value irrespective of the program in which the unit is undertaken. An important aspect of the Act's implementation was the introduction of an electronic information and communication system, the Higher Education Information Management System (HEIMS), to inform the community at large. HEIMS has two portals: a public portal where potential students would be able to access information such as higher education courses, units of study, unit costs and admission requirements, and a private portal – a personal site for students to access their enrolment and other details (HEIMS, 2006). Thus, as a step toward compliance, Victoria University needed to supply information for the public through HEIMS.

One of the aims of the "The Credit Point System" policy was to achieve no nett loss of taught load, including service teaching across and between faculties. Another consideration in the implementation of Step 2 was the completion of a standard proforma for effecting program conversion. This was particularly pertinent to English language teaching staff from the School of Communication, Culture and Languages in another faculty who serviced the language and communication teaching of the pre-HESA IT program.

Independent of HESA, Victoria University's "Core Graduate Attributes (CGA) Policy" embodied the broad aim of preparing students for lifelong learning in the four scholarship categories of discovery, application, integration and learning. To this end, the policy was developed with the stated objective of improving employment outcomes for its graduates and the policy mandates that a necessary condition for fulfilment of all undergraduate programs is for students to complete an assessment that encapsulates the four scholarships (Miliszewska & Tan, 2004a). Thus, this capstone assessment must be embedded within a core unit of study at final year level of the IT degree.

b) Academics

Hurst et al. (2001) concur with us that the primary driving force for academics involved in the teaching of the IT degree program is the validity and value of curriculum for students, both current and prospective. Moving to 4 * 12 cp per semester, as it appeared on paper, would result in fewer units being taught and thus implied that the breadth and depth of syllabus might not be covered. To effect the review would require the re-identification of core content within the curriculum. So despite a reduction in the number of units, it would be important to ensure that there would be no overall loss of teaching content.

Guided by the requirements of the accreditation body, the Australian Computer Society (ACS), staff identified the core body of knowledge to include programming, software engineering, conceptual modelling, databases, data communications, security, computer organization & architecture, and mathematics. A fundamental

inclusion in the course was a capstone task to provide students with an opportunity to work on a real-life software development through two Project units where they synthesized and consolidated their knowledge (Miliszewska & Tan, 2004b). These units would be the final and all-encompassing subjects in the degree program. It would be expected that students would also acquire non-technical skills like project management and awareness of business practices (Fairchild & Taylor, 2000; Novitzki, 1998). These important units would be supported by the English language lecturers who, although not familiar with the computing side of the projects, could play a vital role in helping students realize the importance of good communication and presentation skills.

c) ACS & Industry

The ACS, as the accreditation body, is responsible for the standards of knowledge in IT degree programs throughout Australia. This organization examines the quality of a program through an assessment of the content and structure of syllabi against the Society's core body of knowledge. A set of ACS mandatory skills including project management, interpersonal communication, and professional practice must be incorporated within a program before it can be accredited.

A research on employer satisfaction with graduate skills found that Computer Science graduates lacked problem solving and communication skills (AC Nielsen Research Services, 2000). Relatively low ratings were given by employers assessing new graduates in their written and oral business communication skills, initiative, leadership qualities, personal presentation, and problem solving skills. Employers wanted graduates with all of those skills together with knowledge, intellect and a willingness to learn (Harvey et al., 1997).

d) Students

In Australia, political weight is attached to student evaluations, where they used as a performance indicator by the independent auditing body Australian Universities Quality Agency (AQUA) to assess the quality of a university. It would be a foolhardy department that chose to ignore their students' desires and interests since it is the second most important driver for curriculum change in Australian computing departments (Gruba et al., 2004).

In their research of what students want from their IT programs, Venables et al. (2006) found that students were very pragmatic. Student priorities included transparency of unit worth for planning, admission requirements and the value to employers of the degree program. Students expected that their program would be professionally accredited and incorporate cutting edge technologies.

THE RESPONSE

The Course Review Committee saw the extra ordinary revision imposed by HESA as an opportunity to restructure and enhance the educational outcomes of the course so that it better addressed the core body of knowledge in ICT programs as required by the ACS. However the implementation of the new 4 * 12 cp program necessitated a reordering of material to reduce the number of study units from 28/29 to 24. To consider the needs of all stakeholders and weigh possible alternatives became a very time consuming 3 months process, relying upon the collegial goodwill amongst the more than 30 staff representing programming, information systems, internet technologies and networking, security, mathematics and English streams.

To accommodate the new 3 year program, an increase was made in the number of face-to-face contact hours with students from 3 to 4 hours a week for all second and third year units and a minimal change was needed to revamp first year units. In deciding upon core components, the response was guided by both the ACS framework documents and the CGA policy of the University, the two final year Project and two English units were included as mandatory in the degree. However, due to the increase in face-to-face contact hours, the original 4 units were reorganized into 3 units. Note that no loss of taught load for the School of Communication, Culture and Languages staff occurred as some study material was incorporated into the second Project unit. In addition, the two semesters first year enabling English subjects were consolidated into a single subject resulting in an identical number of hours to be taught at the first and third year level. Also the restructure of the IT program allowed the introduction of new topics and subjects, for example, the shifting of a unit in Database Systems 1 from second year to first year had facilitated the introduction of an additional elective in the second year. To strengthen our program in the area of data structures and algorithms, a formal elective in Discrete Mathematics was introduced as a core unit in the first year instead. The resulting program HESA compliant structure is shown in Table 2 below.

Table 2. HESA compliant IT program structure at Victoria University

Unit of study		Year	Semester
Year 1			
RCM1311	Programming 1	1	1
RCM1115	Computer Systems & Architecture	1	1
RCM1711	Mathematical Foundations 1	1	1
RCM1613	Applied Statistics 1	1	1
RCM1312	Programming 2	1	2
RCM1114 OR RCM1614	Introduction to Computing & the Internet Applied Statistics 2	1	2
RCM1713	Discrete Mathematics	1	2
RCM1211	Database Systems 1	1	2
Year 2			
RCM2112	Operating Systems	2	1
RCM2311	Object Oriented Programming 1	2	1
RCM2312	Software Engineering	2	1
	One elective	2	1
RCM2111	Data Communications and Networks	2	2
RCM2218	Database Systems 2	2	2
RCM2313	Software Development	2	2
	One elective	2	2
Year 3			
RCM3001	Project 1	3	1
ACE 3145	Professional Communication	3	1
RCM3314	Object Oriented Analysis and Design	3	1
	One elective	3	1
RCM3002	Project 2	3	2
RCM3312	Intelligent Systems	3	2
RCM3313	Software Engineering 2	3	2
	One elective	3	2

At the end of an exhausting review process, the Course Review Committee delivered what they believed to be an enhanced and academically sound IT degree program situated on top of a HESA compliant structure. Whilst being sensitive to the needs of all stakeholders, the new structure achieved no reduction in taught load of academics whilst improving the fit with the ACS mandatory body of knowledge for the discipline and complying with the University's CGA policy. Overall, the IT program has achieved a tighter structure with fewer electives spanning the core body of knowledge. With the addition of extra face to face contact time per elective, it is now possible to cover more advanced level topics which added extra breadth and depth in information technology that had not been previously possible.

CONCLUSIONS

Satisfying the needs and expectation for all stakeholders in a normal cycle of academic review for any program is challenging enough. It is particularly more difficult when the impetus for change is driven by an external force, such as national legislation. Typically, in these instances the timing can be problematic, especially where political machinations for funding can come into play; academics charged with the responsibility for implementation do not necessarily have the same goals in mind as their financial masters! Rather academics concern themselves more with the learning outcomes and the core body of knowledge within their discipline (Toleman et al., 2004).

For continuing students migrating to the new structure, the sudden artificial transition to the 4 * 12 model caused many problems. Dependent on which set of previously completed units a student possessed, the new structure progressed some students and retarded others within the same cohort. To nullify this erratic effect and ensure fairness to all members in the student body, a specific individual mapping was created for every single student in the program. This created an enormous administrative burden for the academic advisor. The first implementation of the new HESA compliant program took effect for the academic year commencing in

March 2006. With only one semester completion, at the time of writing, anecdotal evidence from students and staff has indicated that the new system does allow for more in-depth coverage of materials particularly with the additional face-to-face contact within specific courses. However, a more systematic analysis is planned for the future, along with consideration of the implications on existing study pathways for students articulating into the program through recognition of prior learning or credits transfer.

In this paper we offer an insight into the process of arriving at HESA compliancy; in this instance the local implementation involved taking a more lateral view of the degree versus the longitudinal view of the institution. The issues under consideration are not unique to this degree program or this University. In a 2003 survey of 19 different Australasian higher education institutions covering 75 different cases of curriculum change, Gruba et al. (2004) concluded that "there needs to be a balance between institutional objectives and that of academic staff." Overall the study found that most academics, like us, remained confident that their programs were academically sound despite being under considerable institutional pressures to implement changes for financial concerns. It does however raise the overriding and most important question of

Who SHOULD drive the changes in the IT curriculum – government, institution, professional bodies, industry, employers or students?

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