

Rationalising Student Numbers in Degree and Diploma Courses: The CPIT Experience

Chris McCarthy

Christchurch Polytechnic Institute of
Technology

mccarthycm@cpit.ac.nz

Trevor Nesbit

Christchurch Polytechnic Institute of
Technology

nesbitt@cpit.ac.nz

Abstract

Christchurch Polytechnic Institute of Technology (CPIT) delivers both its three year BICT degree and the two year level 6 DipICT programme in parallel with sufficient student numbers to justify the two separate programmes. Both qualifications even go so far as to have three areas of specialisation or streams – network administration, programming and multimedia. However, from time to time, there have been subject areas in one or both of the two programmes' specialisation areas that have been low enough to make it difficult to justify to CPIT administrators running some of these courses. The fact that these subject areas were required by industry became increasingly difficult to satisfy the administrators' requirements to meet budgetary constraints. The Programme Leaders of the two programmes of study examined ways and means to provide students with a range of course and specialisation choices that also satisfied industry's need for graduates and the administrators' budgetary compliance requirements. This paper looks at the various proposals created by the two Programme Leaders over the past two years.

Keywords: rationalising student numbers, rationalising courses, meeting students' needs

1 Introduction

CPIT (CPIT) has been delivering courses from the Diploma in Information and Communications Technology (DipICT), formerly the Certificate in Business Computing (CBC) and Diploma in Business Computing (DipBC) since these programmes of study were introduced by the National Advisory Committee on Computing Qualifications (NACCQ) in 1988 (Robertson and Ross, 2003). In 1996 CPIT commenced delivery of a Bachelor of Business Computing (Joyce, Bridgeman and Nesbit, 2005), with this degree being replaced in 2002 by the Bachelor of Information and Communication Technologies (BICT) (Nesbit and Isitt, 2004).

McCarthy and Nesbit (2007) described the process by which graduates from the DipICT (Level 6) programme can gain advanced standing entry into the BICT degree, and the relative success rates of the students who follow this process relative to students who enroll in the degree programme from their first year of study. Robertson and Ross (2003) provided data that shows a decline in the number of institutions offering the level 6 DipICT programme from 1996 to 2002, with this period of time being when a number of institutions began offering degree programmes, with the reason for this appearing to be a desire to not have two sets of programmes offering similar content at similar levels that were competing for the same students.

CPIT has continued to deliver both its three year BICT degree and the two year level 6 DipICT programme in parallel with sufficient students numbers to justify the two separate programmes, however from time to time there have been subject areas in one or both of the programme areas that have been low enough to make it hard to justify running some of these courses. As a result of this, there have been three subject areas where degree and diploma students have been combined into the same courses, either by having one group of students formally enroll in courses from the other programme or by co-delivering the content to two groups of students and assessing separately. In two cases the structure of the degree programme has been altered to allow for courses from the diploma programme to be included as part of the degree in a manner that addresses any perceived lowering of academic rigour.

This paper reviews literature relating to other institutions who have undertaken similar types of rationalizations, presents and analyses the three different cases from CPIT in which student numbers in degree and diploma courses have been rationalized to maintain the level of choices that students in both programmes have traditionally had.

2 Literature Review

A literature search using relevant key words produced a narrow range of results. However, these results all showed literature pointing to the necessity of addressing the issue of small classes in a manner that did not discriminate against the students who wished to enroll in such courses.

In all cases it was seen as an issue of collaboration. In the case of Drummond (2002) it was a matter of recommending the Australian

Group of Eight Universities (Adelaide, Australian National, Melbourne, Monash, New South Wales, Queensland, Sydney, and Western Australia) convert to a single university with multiple campuses, with students being able to enroll in a course at any one of them, thereby reducing overheads and increasing the service to students.

This is a similar concept to the UHI Millennium Institute, a collection of colleges and research institutions throughout the Highlands and Islands of Scotland. Providing university-level education through a distinctive educational partnership or collaboration, they have a student-centered culture and an individual approach to student learning (UHI Millennium Institute, 2007).

A further Australian work in the same vein from the Tasmania University Union (2002) states that seeking to reduce the scope of courses offered on the basis of efficiency is short-sighted and reactionary. It was recommended that the best solution to declining numbers, increased overheads and the increasing need for valuable specialisation was to take advantage of the economies of scale. By taking such advantage it was seen to reduce course costs and provide education in the most efficient manner possible.

Yet further Australian references all came to the same conclusion – if a course does not meet minimum enrolment numbers rationalize the course by either identifying whether it is necessary to be offered across more than one campus or school, reduce wasteful repetition, foster multi-disciplinary collaboration and ensure that vigorous research is undertaken to confirm ongoing demand before developing new programmes (Turner, 2006)

3 Rationalisation of Courses at CPIT

Over recent years, CPIT had seen the number of students enrolled in the Network Administration stream of the DipICT (Level 6) grow, and the mostly theory Networking stream in the BICT decline. Similarly, the number of students enrolled in the Programming stream of the BICT grew, and the Programming stream in the DipICT (Level 6) decline. Finally, the number of students enrolled in the Multimedia stream of the DipICT (Level 6) grew, and the Multimedia stream in the BICT decline.

While the reasons for this were not clear, student satisfaction surveys strongly indicated a desire for the type of courses offered in the Network Administration and Multimedia streams within the DipICT (Level 6) and students seemed to be “voting with their feet” away from the Networking and Multimedia streams in the BICT, by default making the Programming and eCommerce streams in the BICT a popular choice.

Apart from the same principles of declining enrolments in the DipICT (Level 6) Programming stream and the BICT’s Networking and Multimedia streams as applied to the various Australian reports and the UHI Millennium Institute’s scenario mentioned in the Literature Review, CPIT did not need to look across campuses or other institutions.

All CPIT had to do was collaborate between the DipICT (Level 6) and the BICT by the two Programme Leaders drawing up proposals that would put the declining programming students in the DipICT in the same classroom as the BICT students and the declining Networking and Multimedia students in the same classroom as the DipICT students, thereby rationalising courses, resources, staff, and classrooms – and giving students new options now that had

previously been under the threat of the axe. The following sections outline how each of these rationalisations were achieved.

3.1 Networking and Operating Systems

Up until 2006 the structure of networking and operating systems components of the BICT degree was comprised of some courses that were compulsory for the degree and some that were required for the networking stream (with each stream in the degree requiring 60 credits at that time). Those that were required for the networking stream included a 15 credit level 7 (3rd year) course that could be either BCCS301 (Network Technologies) or BCME351 (Communications Engineering II), along with at least 37 credits from a range of level 6 (2nd year) networking and operating systems courses and at least 8 credits of level 6 programming. At first year level there was a compulsory 7 credit level 5 course (BCCS111 – Computer Architecture). This information is reproduced in Table 1.

Students completing other streams in the BICT degree (Programming, eCommerce and Multimedia) were also required to complete 15 credits of courses from BCCS203, BCCS211, BCCS221, BCCS222, BCCS251 and BCCS341.

Prior to 2004, all students completing the networking stream of the degree were required to complete BCCS301. Falling numbers in this stream of the degree resulted in discussions with the School of Engineering who offer a Bachelor of Engineering Technology that included BCME351 which covered approximately the same material. As a first step towards the rationalization, the regulations for the BICT degree were amended to allow for BCME351 to be included instead of BCCS301,

with the result being that BCCS301 has not been offered from 2004.

The BICT degree was re-documented in 2006, with the new version of the degree being offered from 2007. The issues that were addressed in the re-documentation of the networking stream in the degree were:

3.1.1 Low Pass Rates in Level 6 Courses

Low pass rates in the level 6 courses: BCCS203, BCCS211, BCCS221 and BCCS222. This was addressed by replacing the 7 credit BCCS111 with a 15 credit BCCS153 (Computer Architecture) with the aim of better preparing the students for these level 6 courses.

3.1.2 The Need for Data Communications to be Compulsory

There was a desire for all students in the degree to complete the Data Communications and Networks course (BCCS203), which resulted in a decision being made for this course to be compulsory for the degree.

3.1.3 Low Numbers Enrolling in BCCS211, BCCS221, BCCS222 and BCCS251

Low numbers of students had enrolled in these courses in the preceding years to the point where BCCS221 and BCCS251 were offered rarely. This was going to be exacerbated by BCCS203 becoming compulsory for all students, which would mean that the only students likely to enroll in BCCS211 and BCCS222 being students that were completing the Networking stream of the degree.

This was addressed by allowing students to include level 6 courses in operating systems and networking related topics from the DipICT (Level 6) qualification that covered much of the content of the Microsoft Certified Systems

Engineer (MCSE) and Microsoft Certified Systems Administrator (MCSA) qualifications. These courses are shown in Table 2 along with the MCSE exams that they relate to (courses marked with an asterisk related to the MCSA qualification).

3.1.4 Potential Loss of Academic Rigor from Including DipICT Courses in BICT

It was felt that by some of the staff involved in the change that the incorporation of the Dip ICT (Level 6) courses had the potential to reduce the academic rigor of the Networking stream in the BICT. This was addressed by the creation of an 8 credit “Contemporary Issues in Networking” course at level 7 (BCCS391). The aim of this new course is “To provide students with the opportunity to research contemporary issues in Networking, and present the findings in a manner that may be suitable for a non-refereed stream at a conference”

3.1.5 The Resulting Structure of the Networking Stream in BICT

With BCCS203 (Data Communications and Networks) becoming a compulsory course for all students in the degree, this reduced the size of each of the streams from 60 credits to 45 credits. The 45 credits that now make up the Networking stream include the 15 credits from one of the original level 7 courses, the 8 credit Contemporary Issues in Networking course, 8 credits of level 6 programming and at least 14 credits of level 6 networking and operating systems courses from the MCSE courses in the Dip ICT qualification. With the degree students being able to include 30 credits of electives in their degree, this enables networking student to include up to 7 of the MCSE courses in their degree, which easily cover the course material for the MCSA qualification if the correct ones

are chosen. This new structure is shown in Table 3.

3.2 Programming

The rationalisation of programming courses across the diploma and the degree took the form of enabling students in the diploma being delivered the same content as the degree courses by sitting in on their classes. This section presents the courses where this was done to enable diploma students to complete more programming courses and how the issues of different styles of assessment were dealt with in one particular case.

3.2.1 Programming Course Made Available to Diploma Students

In the DipICT (Level 6), beyond the two compulsory core programming modules of PP490 and PP590, programming was an elective specialisation. In the past five years, as the level of interest in Network Administration as a specialisation increased, the level of interest in programming declined. This meant that by 2006 we had some courses with as low as only five or six students. It was deemed at the time to be of value to continue offering these courses with such low numbers because of the need of the local industry. However, it did become increasingly difficult to justify the overheads to CPIT’s administrators.

Historically, the DipICT (Level 6) had offered introductory level programming in Object Orientated Methods/Jade (NDOO500 and NDPP515), C (NDPP510), Java (NDPR507) and until recently Visual Basic or VB.net (NDPP514). At a higher level, students were offered C++ (NDPR611) and until recently more VB.net (NDPR614).

In order to continue to meet the needs of Level 6 Diploma students, the needs of the local

industry and those of CPIT’s administrators, the Diploma and Degree Programme Leaders, in conjunction with the staff within the School of Computing responsible for timetabling, looked at ways of bringing the Diploma students in to the same classroom as the relevant Degree students. A match was made of the immediately available courses as per Table 4.

Diploma Programming Course	Degree Course equivalent
NDOO500 Object Oriented Techniques NDPP515 Programming Practice (Jade)	BCSE101 Software Engineering 1A
NDPR507 Programming (Java)	BCPR212 Intro to Programming in Java BCPR222 Best Programming Practice in Java

Table 4 - Immediate comparison between programming courses in the Level 6 Diploma and the BICT

This comparison then gave rise to the ability to make further matches and both bring back programming courses that had been dropped from the Level 6 Diploma and add more to the Diploma programming specialisation. Table 5 shows the list of new courses that can now be offered to Level 6 Diploma students by rationalising with the equivalent Degree course and run whenever that Degree equivalent is offered.

Diploma Programming Course	Degree Course equivalent
NDPR505 Programming (Jade)	BCSE102 Software Engineering 1B
NDPR614 Programming (Interactive) - VB	BCPR213 Into to Programming in VB.net BCPR223Best Programming Practice in VB.net
NDPR795	BCPR342 Server Side Programming

Table 5 New programming courses able to be offered to Level 6 Diploma students

3.2.2 Dealing with Assessment Issues

With the BICT degree following achievement based assessment (with 50% as the pass mark) and the DipICT following mastery based assessment (with 80% as the pass mark) an issue arises over how to assess both groups of students using the same assessment tools.

The courses where the practice of co-delivering the courses has been in place the longest is with BCSE101 (a 15 credit level 5 software engineering course from the degree) and NDOO500 and NDPP515 (two 7 credit level 5 courses from the diploma). It was decided to have different test/exams that reflected the different nature of the assessment philosophies in the two qualifications. However, it was decided to use the same assignments for each group of students, and to deal with the differing pass marks by using a rubric for the marking schedule, with a different scale on it for each group of students.

Table 6 shows an example of a rubric that would be used to assess students where they were enrolled in the degree course doing the assessment. The assessment is in 3 parts with each part being given a mark out of 5. For each part of the assessment words are written into the grid to describe factors constitute each mark. The score for each part is then multiplied by the weighting of that part of the assessment and the totals are then added up. In the example shown the weightings add up to 10, and with the maximum mark for each part of the assessment being 5, this gives a maximum for the assessment of 50.

Table 7 shows an example of a student who scored 3, 2 and 4 respectively for each part of the assessment which results in the student gaining a mark of 32/50 for the assessment. If a student was to be awarded 2.5 for each part of the assessment they would end up with 25/50 overall for the assessment, which is a pass, but not a spectacular pass.

Table 8 shows the rubric that would be used to assess students enrolled in the diploma course that were doing the assessment, with the only change being the marks awarded for each factor in the top row of the rubric. A student performing the same as the student in Table 7 would be awarded 4, 3.5 and 4.5 respectively for each part of the assessment. Such a student would gain 41/50 which is a pass, but not a spectacular pass.

The use of these two different scales on the rubrics has enabled the same assessments to be used for two different groups of students, thereby creating some economies of scale in the marking of assessments.

While some of the rubrics have now been in use for almost four years, all of them will not be fully tested until the end of a further twelve

months. At this point the effectiveness of the rubrics should be further investigated.

3.3 Multimedia

The issue driving the rationalisation of multimedia courses is the declining numbers of students enrolling in the level 6 and level 7 multimedia courses in the degree, to the extent where this stream of the degree is unsustainable. All students in the degree are required to complete a level 5 multimedia course: BCIT152 – Introduction to Multimedia (15 credits).

Aside from the compulsory courses and business electives that must be completed for the degree, students completing the multimedia stream are also required to complete the courses shown in Table 9.

3.3.1 Multimedia Courses Made Available to Level 6 Diploma Students

Parallel to any concerns over the viability of the Multimedia Stream in the BICT, the DipICT (Level 6) Web Development/Multimedia Specialisation was enjoying popular success and a high level of software-orientated development. This level of success was planning to be capitalized on by adding further courses to the DipICT especially in the areas of animation and project work.

Currently there is a cluster of two 7-credit courses (MA500/MA600) and a 14-credit course DG600 being offered in the multimedia specialisation in the DipICT. It is planned to introduce two new courses – the 7-credit AN600 and the 14-credit MA701. This would give:

Diploma course		Credits value
MA500 Multimedia Principles		7 credits
MA600 Multimedia Development AN600 3D Modeling & Animation	7 credits 7 credits	14 credits
GD501 Graphic Design		7 credits
DG600 Dynamic Graphics		14 credits
MA701 Multimedia Applications		14 credits

Table 10 Proposed structure of the Multimedia specialisation in the DipICT (Level 6)

The 15-credit courses from the BICT could then be aligned to share delivery, rooms, applications, and experiences, but with some additional reflective content included at the appropriate degree level.

A new 15 credits level 6 course (BCIT252) could be created that brings together the content of MA600 and AN600 (both 7 credits) in a similar way to which BCSE101 maps to OO500 and PP515. This new level 6 course would have three components, with the first two mapping to MA600 and AN600 respectively with the third component being an exam that tests the theoretical background that relates to the content.

A new 15 credits level 7 course (BCIT352) could be created that is based on the 15 credit MA701, and would include the practical aspects of the MA701 course along with an exam that tests the theoretical background that relates to the content.

In a similar way to the networking stream of the degrees includes a level 7 contemporary issues course, a new 8 credit level 7 course (BCIT391 – Contemporary Issues in Multimedia) is proposed to preserve the academic rigor of the multimedia stream and would be designed to cover any content that is lost from the original level 6 and level 7 courses.

To accommodate this introduction of this course, the number of level 6 programming credits required in the multimedia stream would be reduced from 15 credits to 8 credits. This allows the first of the electives completed by these students which would allow for them to complete the 14 credit DG600 (Dynamic Graphics) course from DipICT as an elective.

The proposed new multimedia stream is shown in Table 11.

4 Analysis and Discussion

Key factors in the process were to provide suitable options across all streams to meet the needs of students, industry and CPIT administrators – without sacrificing course integrity and academic rigor.

This has been achieved using three different processes:

- Allowing DipICT courses to be credited directly into the BICT as has been done with the networking and proposed multimedia streams
- Co-delivering content to students in both programmes as has been done in the programming and proposed multimedia streams
- The creating of contemporary issues research based courses at level 7 as has been done in the networking and proposed multimedia streams.

An issue yet to be considered is the impact of combining students from the two different programmes together.

5 Conclusions

The approach that CPIT has taken not only means that students have not lost options but have, in fact, gained more. This exercise could be of benefit to other institutions both internally across different programmes of study but also across institutions as described in the Australian models. It may be of particular benefit in regards to those involved in the ITP collaborative degree as proposed by Corich (2001 and 2006) and Corich and Nesbit (2004).

6 Recommendations

Further study needs to be carried out into:

- The effective use of the rubrics
- The impact of combining students from different programmes together

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Required for Networking	
15 credits from	BCCS301 – Network Technologies (15 credits) BCME351 – Communications Engineering II (15 credits)
37 credits from	BCCS203 – Data Comms & Networks (15 credits) BCCS211 – Operating Systems Theory (8 credits) BCCS221 – Applied Operating Systems A (7 credits) BCCS222 – Applied Operating Systems B (7 credits) BCCS251 – LAN Administration (15 credits) BCCS341 – Web Server Administration (7 credits)
8 credits from	Level 6 Programming Courses in BICT
Compulsory for Degree	BCCS111 – Computer Architecture (7 credits)

Table 1 – Structure of BICT Networking Stream Up Until 2006

Course Code	Course Name	Level	Credits	MCSE Exam
NDOS653*	Operating Systems (Windows Client)	6	7	70-270
NDNM611*	Network Admin Applied -Active Directory	6	7	70-290
NDNM630*	Network Infrastructure	6	7	70-291
NDNM640*	Fundamentals of Security	6	7	70-220 & Security+
NDNM612	Network Admin Applied -Advanced Active Directory	6	7	70-294
NDNM614	Network Admin Applied –Environment	6	7	70-293
NDNM616	Network Admin Applied -Directory Services Design	6	7	70-219
NDFP700	Firewall/Proxy Server	7	7	70-227 & 70-22-
NDGS700	Groupware Server Administration	7	7	70-284

Table 2 – Networking Courses from DipICT (Level 6) Now Available for BICT

Required for Networking	
15 credits from	BCCS301 – Network Technologies (15 credits) BCME351 – Communications Engineering II (15 credits)
8 credits from	BCCS391 – Contemporary Issues in Networking (8 credits)
14 credits from	NDOS653 – Operating Systems (Windows Client) (7 credits) NDNM611 – Network Admin Applied -Active Directory (7 credits) NDNM630 - Network Infrastructure (7 credits) NDNM640 - Fundamentals of Security (7 credits) NDNM612 - Network Admin Applied -Advanced AD (7 credits) NDNM614 - Network Admin Applied –Environment (7 credits) NDNM616 - Network Admin Applied -Directory Services (7 credits) NDFP700 - Firewall/Proxy Server (7 credits) NDGS700 - Groupware Server Administration (7 credits)
8 credits from	Level 6 Programming Courses in BICT
Compulsory for Degree	BCCS153 – Computer Architecture (15 credits)

Table 3 – Structure of BICT Networking Stream from 2007

	5	4	3	2	1	0	Score	Weight	Total
Part A								2	
Part B								3	
Part C								5	
								Total/50	

Table 6 – Example of a Rubric for Assessing Degree Assessment (without the detail of the text in each grade range column)

	5	4	3	2	1	0	Score	Weight	Total
Part A							3	2	6
Part B							2	3	6
Part C							4	5	20
								Total/50	32

Table 7 – Completed Rubric for Assessing Degree Assessment (without the detail of the text in each grade range column)

	5	4.5	4	3.5	2	0	Score	Weight	Total
Part A							4	2	8
Part B							3.5	3	10.5
Part C							4.5	5	22.5
								Total/50	41

Table 8 – Completed Rubric for Assessing Diploma Assessment (without the detail of the text in each grade range column)

BCIT251	Multimedia Application Development	15 credits
BCIT351	Multimedia App Dev & Management	15 credits
	Level 6 Programming	15 credits
	Elective #1	15 credits
	Elective #2	15 credits
Total		75 credits

Table 9 – Courses Completed By Multimedia Students Aside From Compulsory and Business Courses in Original Multimedia Stream

BCIT252	Multimedia and Animation Development	15 credits
BCIT352	Multimedia Development Project	15 credits
BCIT391	Contemporary Issues in Multimedia	8 credits
	Level 6 Programming – which could be BCPR216 (Introduction to Multimedia Scripting in Action Script)	8 credits
	Elective #1 – which could be DG600 (Dynamic Graphics from DipICT)	14 credits
	Elective #2	15 credits
Total		75 credits

Table 11 – Courses Completed By Multimedia Students Aside From Compulsory and Business Courses in Proposed Multimedia Stream