. CHARLES DARWIN UNIVERSITY

STUDENT OUTCOMES IN COMMON UNITS

A REPORT TO THE COMMON UNIT COMMITTEE ON THE PREDICTORS OF ATTRITION IN THE COMMON UNIT PROGRAM (1999-2002)

BILL TYLER (CONSULTANT)

WITH

NICOLA PRICHARD (PROJECT COORDINATOR)

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EXECUTIVE SUMMARY

This project began as a specific investigation into the differential rates of withdrawal and failure between internal and external enrolments in the Common Unit Program. Under direction from the Committee, the initial inquiry was subsequently developed into a much more comprehensive analysis of the relationships between modes of unit delivery and a host of other student characteristics, both socio-demographic and situational. The development of a generic model of prediction of student outcomes was firmly grounded in the research literature, both Australian and international, on the effects of these predictor variables, as well as in the experience of other universities in delivering core or foundation programs to first year students.

Major Findings: Though far from exhaustive of all the possible predictors of student outcomes, the following findings are put forward as the basis for further research and intervention:

a) The two indices of attrition in Common Units enrolments – rates of withdrawal before census date and a fail result appear to be quite distinct kinds of outcomes, each with its own unique pattern of prediction from various student characteristics.
b) Higher incidence of failure was predicted by Indigenous identity, external mode of delivery, male gender, being under 25 yrs and enrolment in a social or cultural studies field.
c) Higher incidence of withdrawal was associated with an internal mode of delivery, full-time status and age 25+ yrs at time of enrolment in the unit. Both health studies and social and cultural studies fields predicted lower rates of withdrawal when other factors were controlled.
d) With the exception of Indigenous identity, student enrolment characteristics did not predict the category of fail grade awarded (i.e. F vs FA/WF) and thereby do not appear to be a factor inflating the failure rate of groups with lower rates of withdrawal. Indigenous enrolments, however, were found to be a special case in that there appears to be a strong link between their lower withdrawal rate and their higher failure rate.
e) Enrolments from a course in a Health Sciences field of studies had a lower rate of failure and a lower rate of withdrawal. Affiliation with a course in a Social and Cultural field predicted a higher rate of failure but lower rate of withdrawal.
f) Overseas citizenship was associated with a lower rate of failure, though this was not statistically significant, when other student characteristics were statistically controlled. This variable may require further breakdown on the basis of nationality.
g) English as a second language was found to have a slight and non-significant association with a lower pass rate and a lower rate of withdrawal. It was not a significant factor in this analysis.
h) A risk of failure analysis based on regression modelling suggests that an enrolment from a student who is Indigenous, male, under 25 yrs and studying in the external mode of delivery will have 2.5 times the probability of receiving a failed grade than an enrolment from a student who is non-Indigenous, female, 25+ yrs and studying internally.

i) Data-mining methods revealed wide discrepancies in the pass rates of fifteen subgroups segmented by age, gender, mode of delivery and Indigeneity. These are unique effects which provide more precise definition of groups at risk.
j) Segments identified by percentage difference in pass rates were (lower rating group first): (i) 38% between Indigenous and non-Indigenous enrolments in 35 + yrs age group, (ii) 25% difference between external and internal enrolments in the 17-19 yr age group (iii) 18% difference between Australian and Overseas enrolments in the 20-25 yr age group and (iv) 17.5 % difference between male and female enrolments in the 25-35 yr age group.

Recommendations:

1. Because, the complex pattern of differential pass rates reflects the diverse socio-demographic profile of the client body, the problem of attrition requires a differentiated and considered response.

2. Inequalities in academic performance are best addressed in terms of "market" segmentations defined by unique combinations or intersections of gender, age, Indigeneity and other predictors, rather than as single dimensions of disadvantage.

3. The effects of diverse student characteristics and situations indicate a need for a more finely attuned response in terms of range of content materials, assessment options, delivery strategies and support and feedback mechanisms. This response should recognise the need for continual integration between general education and skill components of the program.

4. In this respect, a graduated transition toward more flexible delivery strategies for all students (both internal and external) may be considered as a desirable option.

5. Low rates of academic performance may also require university-wide forms of intervention, such as specialised remedial courses for basic skills, adjustment to entry levels and attention to the interface between the Common Units and the goals and methodologies of the student's parent or primary course.

6. In light of the restructurings of Common Units in recent years, it is highly desirable that the Committee review the governance structure of the program, with the objective of securing its stability in terms of content, structuring and range of unit offerings.

7. Coordinators, tutors and lecturers should be informed of the main findings of this study so that issues raised by this analysis might be addressed in all aspects of program development and delivery.

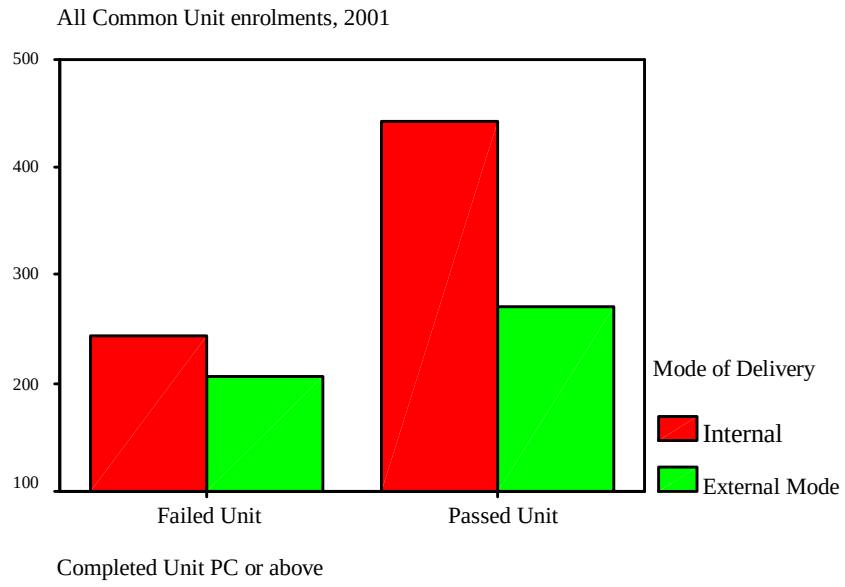
8. An integrated database should be developed for the purposes of monitoring student responses to the Common Units. This database should seek to incorporate levels of student satisfaction with all aspects of the program, enrolment patterns and academic performance, as well as the attitudes and perceptions of students in the first year of a course.

I ATTRITION RATES IN THE COMMON UNIT PROGRAM

Background to the Investigation: Attrition in 2001 In the second semester of 2001, the Common Units Committee of the NTU/CDU noted the high failure rates in externally-delivered Common Units, often in excess of 60% of the total number of enrolments. Further inspection revealed that students who failed had almost invariably not submitted any, or insufficient, assessment work and were consequently awarded a failed grade. Excluding Semester 0, when units are only available in external mode, this differential failure rate across the delivery modes appeared to be independent of the number of enrolments the subject matter studied, or the method of delivery (print-based or online) (Fig 1). Northern Exposure (CUC104), for example, which was delivered to only 35 students in 2001 Semester 1 yielded a pattern of attrition as high as that of other, much larger externally-delivered, print-based units such as CUC101 (offered in Semester 1) and CUC102 (offered in Semester 2).

As demonstrated in Fig. 1.1, the differential failure rate during the whole of 2001 (three semesters) indicated a basis for serious concern associated with the mode of delivery. While the proportion of internal enrolments awarded a passing grade exceeds failures by a ratio of almost 2:1 (64.4% vs 35.5%), the ratio for external enrolments is far less favourable (56.8% % vs 43.2%). The failure rate for both modes is, moreover, very high, when compared with a general HE unit failure rate of just over 20% across the University.

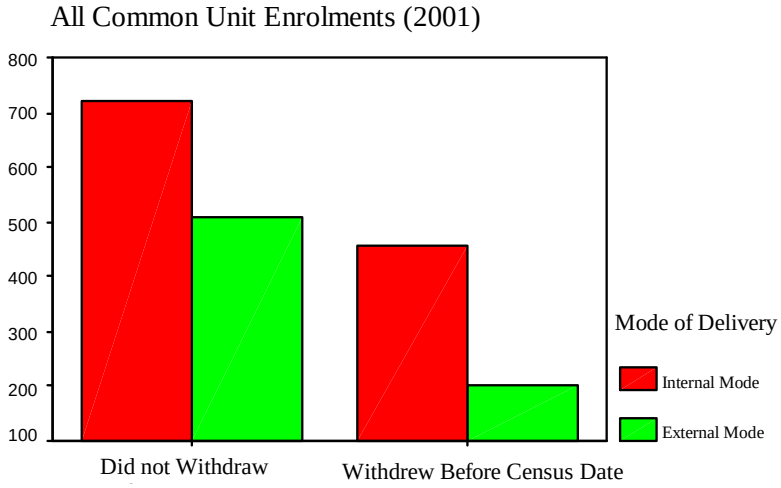
Fig.1.1 Passed Unit by Mode of Delivery



An additional source of concern was the very high rate of withdrawals from the common units occurring before the official census date. This type of withdrawal is not officially reported and some withdrawals may also be caused by switching from one common unit to another (discussed below) or to a late granting of exemption. Nevertheless, the very high rate of withdrawals (over a

third of all enrolments) represented a significant net loss to the program in any one year This type of attrition would seem to be a general reaction to the way the program was being perceived and accessed, rather than being a function of the delivery mode. In contrast to the effect on mode of delivery on the pattern of failure, the rates of withdrawal in the year of concern (2001) for the external mode are 10.4% greater than those for internal enrolments (Fig1.2).

Fig. 1.2 : Withdrawals* by Mode of Delivery



*Withdrawals before Official Census Date

Since the term "attrition" is used here to encompass the high rates of both of these undesirable outcomes (failure and withdrawal), the original focus on external enrolments was widened in the course of the investigation. For comparative and developmental purposes, it was decided that a more inclusive study of the performance of students across the whole program would yield useful information, while at the same time giving depth and relevance to the problems faced by external students. In such comparative framework, it would then be possible to look at the risk factors behind both types of attrition in terms of a range of demographic, situational, and cultural and linguistic variables across all units and years of availability and modes of delivery.

The terms of reference were therefore framed in terms of the following questions:

1. What are the main factors which are likely to affect attrition rates in the Common Units program?

2. How might the relationships between these factors be spelt out in the form of a testable model?

3. Can such a model help to identify types of student who appear to be most "at risk" of either failure or withdrawal?

4. In the light of the findings of 3, what strategies are available for reducing rates of attrition in the Common Units program?

These four questions in turn frame each of the following chapters: literature review, of student withdrawal and failure, and the recommended response for addressing the problems of student attrition. By widening the terms of reference, the problem of failure of external students was therefore given greater scope and relevance, by being embedded within a more systematic study of the range of risk factors affecting student attrition rates across all units and all modes of

delivery. At the same time, no attempt was made at this stage, to address the complex and volatile issue of unit content, or subject matter, which would have required a detailed and much more comprehensive analysis of weighting of topic materials across five units (soon to be reduced to two), assessment methodologies and pedagogic practices. This issue was addressed in the unit-by -unit analysis incorporated into the evaluation study of 1999-2000 (Baldwin & McInnis, 2000) but was not seem as appropriate to this more quantitative study.

This study was therefore well positioned to produce information that might inform the design and delivery of all individual units, as well as providing important directions for the strategic development of the total common units program. This investigation will, because of its policy and pedagogical reference, necessarily focus on those influences on student attrition which can be manipulated or redesigned – factors such as content, availability, access, mode of delivery and media (print vs online) – rather than on those socio-demographic student attributes which are more often the subject of sociological study.

II COMMON UNITS: A BRIEF ACCOUNT

The proposal for a Common Units program originated in the Office of the Deputy-Vice-Chancellor in the mid-1990s, initially as a skills-based compulsory component of all NTU/CDU-accredited degrees ('Rules and Processes for Common Units, 1996). The rationale for the program was broadened by the year of introduction, 1998. There appeared to be four principal objectives of the program in its final form: (1) to provide a counter to the over-specialisation of degree structures and employment orientation in an environment which demands high levels of flexibility and response to rapid change (2) address problems of high attrition rates by development of information-gathering, oral and writing skills at University level, particularly for school-leavers (3) to develop strengths across the University in areas related to the Northern Territory's geographical, cultural and economic location within North Australia (4) to encourage cross-faculty mixing of students and staff (NTU/CDU Common Units Handbook, 1998; Baldwin & McInnis, 2000, p.8).

The program began with four units in 1998, North Australian Studies (CUC101), offered externally and internally in Semester 1), Reading and Writing in the World of Ideas (CUC102), offered internally, Semester 1 and externally, Semester 2) and Thought and Communication (CUC103), Northern Exposure (CUC104),both offered only in internal mode, Semester 2). To these were added Northern Exposure in online external mode in Semester 0, 2000 and Cultural Studies (CUC105), internal, Semester 1, 2001 and in online external mode, in Semester 0, 2002). From 2002 students entering the program were constrained to choose one unit from each of two streams or strands, a regional studies Strand A (CUC101, CUC104 and CUC105) and the more generic and skill-oriented Strand B (CUC102, CUC103). In all units, a compulsory component of 20% of a student's total grade was allocated to an Information Skills component, delivered by University Library staff. Enrolment growth in Common Unit was quite dramatic, almost doubling from 1999 to 2002 (Table 2.1), as new admissions were drawn into the program and as re-accredited courses (eg Bachelor of Laws) now included these units within a professional degree, in some cases as a core component of a disciplinary sequence.

Table 2.1 Common Unit Enrolments (Including All Withdrawals) All Units: 1999-2002

			YEAR				
			1999	2000	2001	2002	Total
Unit Code	CUC101	Count	411	420	454	372	1657
		% within	24.8%	25.3%	27.4%	22.5%	100.0%
	CUC102	Count	429	532	610	798	2369
		% within	18.1%	22.5%	25.7%	33.7%	100.0%
	CUC103	Count	335	418	313	415	1481
		% within	22.7%	28.2%	21.1%	28.0%	100.0%
	CUC104	Count	209	283	359	425	1276
		% within	16.4%	22.2%	28.1%	33.3%	100.0%
	CUC105	Count		128	153	471	752
		% within		17.0%	20.4%	62.6%	100.0%
Total		Count	1384	1781	1889	2481	7535
		% within	18.4%	23.6%	25.1%	32.9%	100.0%

The program was formally evaluated in mid-1999 by consultants from the Centre for the Study of Higher Education, University of Melbourne. The evaluators' report (Baldwin & McInnis, 2000) recommended a restructuring of the program over the longer term. There would be a compulsory 'core' academic skills unit, surrounded by a 'suite' of linked electives (p.71, 2000). This model was implemented in Semester 1, 2002 in the form of a new compulsory skills-based Unit, Academic Literacies (CUC100) which replaced CUC102 and CUC103, plus a single elective, chosen from the remaining three Strand A units (which included a revised Northern Australian Studies unit, North of the Great Divide, CUC101a). Under a second revision, adopted in 2003, the Committee reduced the suite of Strand A electives to a single, regional unit, Northern Perspectives (CUC107), This reduced model is to be implemented in 2004, as existing electives are to be phased out in Semesters 0 and 1 and the new regional unit introduced in Semester 2.

In all, therefore, the Common Units program became established within a very short time within the University, rapidly diversifying into an impressive range of subject offerings in various modes of delivery, whether internal (lecture/ tutorial), print-based external or online. This deployment of a universal and compulsory program throughout the entire Higher Education sector of the University came at a time of financial stress and the search for alternative markets, especially for external enrolments saw a trebling of unit numbers over these years. The program also involved significant numbers of staff, whether as lecturers, tutors or advisors and developers. The concentration of students in larger units resulted in efficiencies of scale which allowed resources to flow back to participating faculties. Resources were also released for experimental and innovative learning methods (esp. in the online provision of CUC104 and CUC105, email discussion groups and information-skills delivery) through the active participation of the staff of the Interactive Learning (Teaching and Learning) Division and the Library (Information Services).

Despite these obvious organisational and pedagogic benefits, the Common Unit program was often, from its origin, the subject of criticism and resistance within the faculties, among elements of the Academic Board, and from many students. Criticism from staff was frequently levelled at the relevance, delivery methods and educational benefits of the program and may have influenced

students' reception of the program. Administrative difficulties at enrolment, some confusion in awarding exemptions and delays in delivery of external materials may have all adversely affected student involvement and motivation, particularly in the early years. These initial problems in the reception of the program were often compounded by the requirement during 1999-2000, of a pass in the Information Skills component.

These background difficulties were to be expected on the introduction of an innovative, interdisciplinary program in a largely vocationally-oriented institution, where the costs and benefits of student time and effort today are precisely calculated. Given these realities, the radical restructuring of the program in 2003-2004 which will see the original five units reduced to two (one skills-based and one general education with an Indigenous and regional focus) may have been a response to institutional and market demands for greater clarity and relevance from a compulsory program.

The Common Units program introduced at the NTU/CDU has precedents in the core studies programs at several other Australian universities which operate in similar environment of diverse student intake, vulnerability to high rates of attrition and student demands for vocational degrees. In fact, the program could be seen as an initiative within a wider response to the spread of mass higher education, first witnessed in the United States in the 1950s and in other Western democracies in the 1970s and 1980's. The development of remedial and skills-based courses, of liberal arts courses ("Great Books") and of general studies offerings are all well-documented responses to the challenges of a changing and diverse student population. The culture life-long learning and of an increasingly credentialised labour market have compounded the pressure on those Universities with a less secure position in the academic market to seek strategies which can minimise the costs of high attrition rates.

Similar programs to Common Units can be found in the compulsory components at other institutions. Some of these are: the Foundation Units at Murdoch University (9 points of a 72 point degree), the Context Curriculum[1] at the Royal Melbourne Institute of Technology (12 credits out of a 96 credit degree) and the Core Units at the University of the Sunshine Coast (24 units out of a 288 unit degree). These programs are all intended for first year students. There are variations at either side of this year as well. Flinders University offers a one year Foundation course which is essentially a non-credit bridging year, and the UNSW has the requirement of 12 units of credit (in a144 unit degree) taken from a wide range of courses in a General Studies program at the second and third years. Both the University of Sydney and Macquarie University are planning generic skills units for first year students in 2004, to be accredited within degree programs.

The 20 credit (2 units x 10) requirement within a 240 credit degree at NTU/CDU therefore places it towards the lower end in terms of the size of the compulsory common component. However, the recent decision to reduce subject offerings to only two units (skills-formation and northern regional study) suggests a tendency towards a utilitarian rather than a the general studies orientation. Such a restriction of choice would appear to be rather narrowing, given the much wider range at Murdoch (6 units internally in any one semester), at RMIT (over 60 units current) and at UNSW (over 70 general studies-coded units). In fact the only comparably narrow range is to be found at the University of the Sunshine Coast (USC), which has a new program with only

[1] From 2004 the RMIT Context Curriculum will be replaced a system of student electives, though the general studies orientation is to be preserved.

two core courses currently on offer (Information and Technology and Communication and Thought), although more are planned.

While the Academic Literacies unit at CDU is no doubt responding to a need for skills-formation, the second, regionally-oriented, unit (Northern Perspectives) would seem to require a high level internal diversification, if the full range of student interests is to be successfully engaged. Strategies for achieving this could well be informed by the results of the analysis of Chapter 3, where the diverse segments of the CDU student population are identified in terms of their characteristic patterns of survival within the program.

III SOCIO-DEMOGRAPHIC EFFECTS ON STUDENT OUTCOMES

This section examines the literature on common units and related programs in order to identify those factors which predict student outcomes. While this review might have dealt solely with the effects of these factors – mode of delivery, the first year experience and socio-demographic background – on academic outcomes, other outcomes produced through student evaluation survey provide important insights into student response and therefore, point to some of the key predictors of success or failure. Although the link between satisfaction levels and achievement may not always be clear-cut or determinate, these student responses do provide a good starting point for identifying the areas which are important for program delivery and management. This is especially the case for a new program, such as the Common Units, where the prediction of levels of acceptance and satisfaction has the potential to yield important insights into the way the program design and delivery impacts on student experience and on the learning process.

We will therefore take a wide-ranging view of student outcomes by taking an increasingly narrow focus, through a review of the evidence for:

i) the general socio-demographic influences on student participation and success
ii) the impact of these factors on the first year experience of university study

In the following chapter we will look at the specific effect of delivery mode on student satisfaction and academic performance levels at university level (face to face vs flexible delivery). This progressive narrowing of level of focus will lead in the following section to a summary of the factors in the prediction of student response to the Common Unit program at NTU/CDU.

(i) Socio-demographic Predictors of Student Success

The prediction of student success from student background factors have been well-studied now for over half a century, and constitute one of the main strands of the social and economic studies of education. In recent years, because of the perceived changes in the markets for private schooling, the influence of multiculturalism and women's education, as well as the increased credentialism in the labour markets, there has been a renewed interest in the prediction of academic achievement in schools and universities. This interest has been spurred by the availability of new techniques of prediction, such as logistic regression, which allow for the precise calculation of the probability of a particular outcome (eg participating in higher education, passing a first year subject etc).

There are two recent major Australian studies which have employed these techniques (which are described and utilised in the empirical section in Chapter 4), namely the results of the Australian Council of Educational Research Report on patterns of participation in Year 12 and Higher Education, based on the Longitudinal Surveys of Australian Youth data (Marks et al., 2000, n=13,000) and the studies of social and economic disadvantage in academic performance by Considine and Zappalà (2002, n=3,000). These recent and wide-ranging studies provide a general basis for identifying some of the major background influences on performance in the Common Units program, as mediated by the other factors reviewed below.

Common Units, designed in part as a transitional program for first year students, is open to influences which affect both upper secondary school and university performance. For practical purposes, the predictors of most interest are those which have direct pedagogic relevance to both sectors and, indeed the overlap between the two studies support this view (as well as that between the predictors of Year 12 and Higher Education participation in the ACER study).

In the present investigation, measures of social inequality, such as socio-economic background and school type, however important as generic predictors, assume less significance. Not only are these not explicitly recognised as identifiers for program design and delivery, but their significance in the Northern Territory context is often problematic and complicated by other powerful influences on performance which are more tractable to coordinators, lecturers and tutors. Given this exclusion, from the studies cited above, the relevant factors for this investigation would appear to be: gender, Indigenous status, achievement in literacy and numeracy, geographical location, ethnicity and non-English-speaking background[1]. These are all factors which are of immediate importance to the design and delivery of the Common Units program, and information is freely available, at the institutional, and in most cases, at the classroom level. We will now examine these factors, while drawing together the threads among the effects that may link gender, Indigenous status, location, and achievement in literacy and numeracy.

Gender has been shown in studies of the past three decades to exert a major influence on academic participation and success, with females outperforming males across a range of outcomes. Young women in 1999, for example participated more than young men by more than 9 percentage points, up from equal participation in the early 1980s (Marks et al., 2000, p. 15). This gender gap has been increasing, even when other factors such as parental occupation and education, location and school type have been taken into account in a multivariate analysis. Marks et al., in fact, demonstrate that, after controlling for differences in these other factors, gender differences in Year 12 participation increase.

In higher education, the pattern is repeated, with gender becoming one of the most significant predictors. In multivariate analysis, the gender gap when controlling for the differences in other factors, increased from equal odds (participation/ non-participation) from around zero in 1980 to roughly 2 times in favour of young women over young men in 1999. This gap is mirrored in rates of academic performance in Considine and Zappalà's national study of 3,000 State school students from Years 1 through Year 12 in 1999. When other variables (such as parental education, NESB, housing, employment income and housing type) were held constant, these authors report that: "female students had a significantly higher predicted probability of achieving 'outstanding' results (18 percent) than male students (12 percent)" (2002, p. 141). The statistical effect of gender is illustrated by the following typical example:

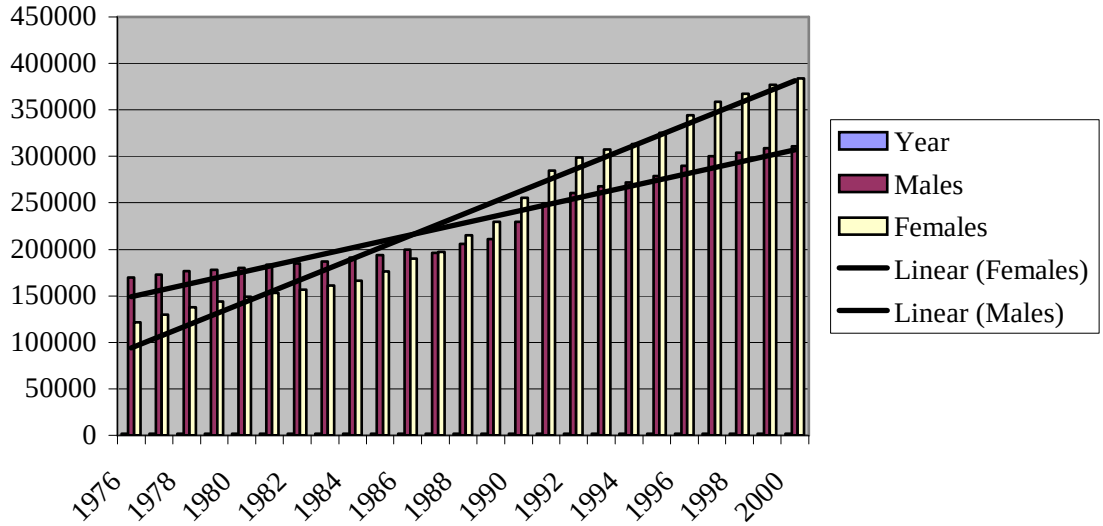
> Example 2: A student in a senior high school from a two-parent family financially dependent on employment income, from an English-speaking background, who has one unexplained (school) absence, lives in public housing in a metropolitan area with one parent who completed TAFE qualifications

[1] Because these studies are based on school-leaver samples, age as a variable is not an important consideration and will be discussed in the following subsections dealing with first year experience and delivery mode.

> Predicted probability of achieving 'outstanding' results: male 13 percent; female 20 percent. (2002, p. 141).

These differences are reflected in the increasing dominance of females graduating from Australian universities, where one may detect a secular trend, when viewed over the quarter century since 1976 (Fig 3.1).

Fig. 3.1 Total Enrolment in Australian Universities by Gender (1976-2000)



*Original chart based on DEST statistics for Higher Education, available at: http://www.dest.gov.au/highered/statistics/timeseries/hestudents.xls (accessed October 12, 2003)

It is noteworthy that this trend pre-dated the Dawkins reforms in higher education, which brought in many female-majority courses in education and health sciences. Rather, the trend towards the majority of females in university courses throughout Australia is driven by a superior performance in academic performance in the highly competitive field of Tertiary Entrance Scores and their equivalent, as the trend in the gender gap from New South Wales statistics demonstrates (Fig 3.2). This trend parallels and then surpasses the trends in participation, rising from 0 in the early 1980s to almost 20 percent in 1996.

Fig. 3.2 Trend in Gender Gap in Tertiary Entrance Scores, NSW*

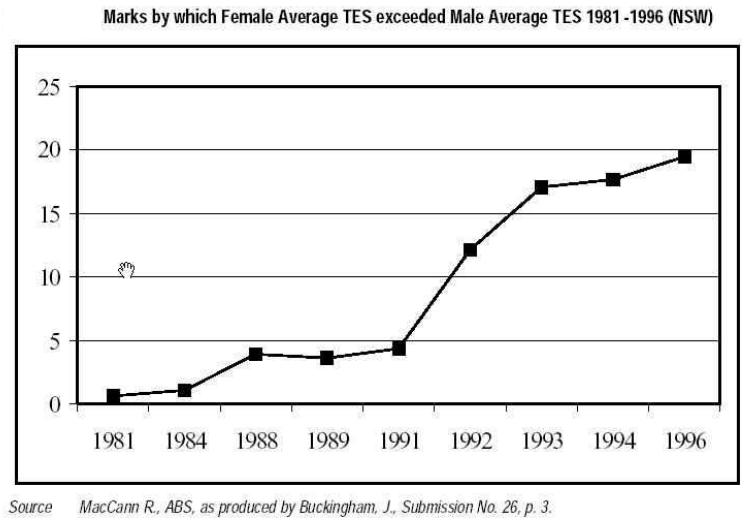


*Fig. 2.3 in DEET Report, *Boys: Getting it Right*, 2002, p.19.

There have been many explanations of this trend, which is common to all developed English-speaking countries over the past few decades. Considine and Zappalà cite:

> biological differences, gender biases (eg reading seen as 'not masculine'); teaching, curricula and assessment (eg less structured approaches to teaching grammar may have weakened boys' literacy performance (2002, p133)

So pronounced and relatively unexpected has been this reversal in gender chances for higher education since the 1970s, that governments have expressed concern about the 'crisis' in boy's education. One of the major responses in Australia was the release in 2002 of the Getting it Right Report by the Commonwealth House of Representatives Standing Committee on Education and Training. This important contribution surveyed all sectors of education in which males are under-performing or over-represented, ranging over topics such as: measures of literacy achievement, school retention rates, results in most school subjects, admissions to higher education, suspension/ expulsion/ truancy/ dropping out and post-school unemployment. The Report recommends a number of changes in policy and pedagogic practice, covering such areas as enhanced school structure, the supply of male teachers as role models, teacher training and teacher quality and literacy education in early years of schooling. These are put against a background of changing family structures, the collapse in the youth labour market and the demand for gender equity as a policy outcome.

This global shift in the dynamics of gender inequality must be put against the persistent gender biases in employment, particularly in the skilled trades, management and many traditional

professions and the higher uptake of males in TAFE courses. There are also distributional differences in male versus female outcomes, in that it appears that male scores tend to polarise between high and low achievement while those of females tend to "cluster around the middle" (Buckingham, quoted by Slattery, *The Australian*, 2003, p. 9 May 21). Although it is not in the scope of this report to investigate the causes of the gender gap in educational outcomes in the Common Unit program, we must note the national and international trends in this direction and to suggest some of the ways in which it may be addressed. There is not doubt that this gap, in the experience of most unit providers, is a major source of concern in its effects on levels of satisfaction, participation and achievement within the Common Unit program. Whether this experiential and anecdotal evidence is confirmed by the empirical evidence which has been gathered from student surveys and official data is yet to be determined.

Indigenous Status has been long recognised as a major influence on educational outcomes and is the subject of a large volume of policy literature. Indigenous students have poor rates of attendance, low literacy and numeracy skills and much lower rates of participation and achievement than non-Indigenous students. Marks et al, for example found that from a Year 9 sample in 1995, 47 percent participated at Year 12 and only 17 percent took some form of higher education Marks et al. (2000, p vi). Long, Frig and Batten (1999), in a study of school to work transition for Indigenous students indicated much lower figures for Indigenous school retention to Year 12 (31 percent compared with 73 percent for non-Indigenous) in 1997 (taking absentees into account). These researchers estimate the participation rate of Indigenous Australians aged between 20 to 24 years at 2%, compared with 11% of non-Indigenous of the same cohort. Marks et al note that participation ratios (non-Indigenous/Indigenous) are much the same for all stages of education (1.6 for Year 12, 1.8 for higher education). Another comparison is by way of examining the effects of Indigenous status on odds ratios (participation/non-participation). These indicate that non-Indigenous students are 3.8 times more likely to reach Year 12 than Indigenous students (Marks et al, p. 27).

The prediction of Indigenous participation is complicated by other factors, and by its difference with non-Indigenous patterns. While females , as we have seen, are now over-represented in higher education, gender ratios are approximately the same for Indigenous males and females (Marks et al., p. 26). Controlling for socio-economic status "makes little difference", according to the statistical analysis of these researchers, reducing the odds from 3.8 to 3.7 for reaching Year 12, and from 2.2 to 1.8 for participation in higher education. On the other hand, these odds are substantially reduced by controlling for literacy and numeracy achievement at Year 9. In fact for higher education this reduction, when socio-economic status is also included, is so great that the Indigenous effect is no longer significant (Marks et al, p, 27). This is not to say that Indigenous status is completely "washed out" as an effect, but rather to indicate that basic skills formation might be an effective strategy for addressing the basic causes Indigenous disadvantage.

Indigenous and low socio economic literacy problems Rose (1999) suggests that the discourses of the western education system are highly specialised and framed for the vocational and professional contexts crucial to modern communities and political participation in these. Implicit in this specialisation is a specialisation according to socio economic class. Only 10 - 20% of students are enabled by the schooling system to continue successfully in tertiary education. Thus, he suggests the education schooling system fails to prepare a large proportion of indigenous and non-indigenous students for a vocational and professional future because it fails to acknowledge the socio-economic and cultural context of all of its students.

Research by Rose (1999) and Barthell (2000) suggests the failure of Indigenous and low socio-economic cohorts relates to the level of literacy in the home. Rose (1999) suggests that children's

home experience with language has a significant effect on their ability to interact with institutionalised text. Rose (1999) cites Painter, Williams and Cloran as all supporting the notion that children from literate middle class families are "privileged" with home experiences (which include extensive spoken interactions and scaffolding, parental book reading) which prepare them to engage with decontextualized texts.

Geographical Location as a predictor is usually defined in terms of the metropolitan/non-metropolitan divide. Rural, remote and other non-metropolitan location categories have been associated with poorer access and lower participation and performance outcomes due to costs, educational quality and choice, and limited recreational and educational facilities (summarised by Considine and Zappalà, 2002, 114). Marks et al. conclude that these effects account for an unadjusted percentage difference of about 10 percent point difference in participation rates at Year 12 (82 vs 71 percent) and in higher education (35 percent vs 25 percent), "no matter what urban/ rural measure is used" (p. 23), with very little difference between remote and "slightly less" remote areas. The gap in academic achievement (as distinct from participation) is smaller, with evidence of only 5% difference in the chances of achieving "outstanding results" across the years of schooling (Considine and Zappalà, Table 1, p. 137). These associations between location and educational outcomes are generally not nearly as great as those for gender or socio-economic status and they reduce to about half of their percentage difference when other variables have been controlled for (eg only a 2 percent gap remains in prediction of "outstanding results" after adjustment for range of other predictors, Considine and Zappalà, Table 4, p.142).

Another important dimension of location is that associated with the effects of State or Territory on participation and retention rates to Year 12, with all its implications for continuing populations for University. Here there are wide differences, with the Australian Capital Territory consistently showing the highest rates and, significantly, the Northern Territory the lowest rates (83 percent and 58 percent respectively, for Year 9 1995 cohort, Marks et al., p. 9). It is interesting that adjusting for other factors such as social background, metropolitan location and school type do not erase these differences in predicting retention, and in some cases, produce a different ranking (Queensland replaces the ACT as the most positive predictor).

Rates for the Northern Territory, even after adjusting for these other factors, still remain lowest in this retention ranking (Marks et al, Table 3, p. 12). State and Territory-based participation rates in higher education are difficult to estimate, due to the out-migration of many young people to inter-state institutions and to the inflow of enrolled students from overseas and interstate, particularly in external delivery mode. These limitations are particularly applicable to the Northern Territory, which has high rates of educational migration, as well as a heavy commitment to external delivery. Nevertheless, the use of student home address identifiers such as postcodes may go some way towards providing a geographical locator. The Darwin / non-Darwin home postcode, for example, might be a proxy for the metropolitan/ non-metropolitan split, since Darwin , though tiny in population has been considered as having metropolitan demographics in several urban studies) A simple dichotomy as NT / Non-NT home residence might provide another useful indicator, even though it may indicate a more complex regional categorisation.

Ethnicity and non-English Speaking Background are often compounded as sources of educational disadvantage, usually through the association between the common ethnic identifier (Father's or Mother's Country of Birth) and the linguistic difficulties experienced by the children of first-generation immigrants from non-English speaking countries. Up until the mid-1970s, these factors were seen as having negative effects on academic achievement and participation in a

largely Anglo-Celtic cultural and linguistic environment (Martin, 1978). However, since this time, studies of children from later waves of migration and of second-generation parents indicate that these backgrounds are not a source of disadvantage. Indeed, all the evidence from the later cohorts demonstrates that, on the average, students from non-English speaking backgrounds (from Southern Europe, Indian Sub-Continent and of Chinese origin) consistently outperform those from either Australian-born and English-speaking or Northern European backgrounds (Considine and Zappalà, 2002, p. 133).

This reversal in the educational performance of ethnic and NESB populations in Australia appears to persist after adjustment for social background and academic achievement. The odds ratio (participation /non-participation), after adjustment for these background effects for predicting participation in Year 12 among five cohorts, was found to be 1.8 to 3 times higher for children of overseas-born fathers than for those whose fathers were Australian-born (2000, p. 13). For the 1995 Year 9 cohort, higher education participation, the odds ratios were 1.9 times higher for those with father born in Southern Europe, 5.6 times for Asia, 4.8 times for the Middle East or North Africa and 2.45 times for the Pacific Islands. The same may be seen to apply for academic achievement throughout the years of schooling (one of factors adjusted for the participation ratios above). Considine and Zappalà found an odds ratio of 1.8 predicting "outstanding results" for all school years for NESB over non-English speaking background, after controlling for gender, employment and a range of other socio-economic variables.

The only groups where NESB appears as a disadvantage were among those of Maltese background in predicting participation in higher education (Marks et al, p. 25) and among those of Middle East/ Africa background in predicting "outstanding results" (Considine and Zappalà, 2002, Table 3, p. 140).These general improvements in rates of academic achievement and participation may nevertheless mask some other significant inter-ethnic differences and hidden pockets of disadvantage, which would require larger samples to discover. Clearly, though, these more recent studies indicate that evidence for disadvantage as an inevitable effect of linguistic or ethnic background is lacking and that, to the contrary, these backgrounds appear to be predictors of higher rather than lower performance across a range of educational outcomes.

NESB Overseas students However, NESB students from overseas present a more predictable picture, which is far from the typical case for second or third generation immigrant families reviewed above. Barthel (1999), for example, cites research by (Booth 1993) at University of Technology of Sydney (UTS) indicating a significantly lower performance by NESB students in five faculties. This failure is often related to differing cultural expectations of what constitutes an academic text not to mention difficulty with syntax and semantics. In the case of NTU/CDU, in the period this research was conducted, some overseas students were being accepted into higher education with IELTS (International English Language Testing System) scores of below 6. (the current entry level for undergraduate study). An IELTS score of 6 is barely adequate for survival in higher education as can be observed from its description in the IELTS handbook for this level:

> Has generally effective command of the language despite some inaccuracies, inappropriacies (sic) and misunderstandings. Can use and understand fairly complex language, particularly in familiar situations.

It is not difficult to extrapolate the struggle students with this level of English language proficiency will experience with readings comprised of abstract, unfamiliar material not to mention the challenge of writing in response to these readings. This distinction between Overseas NESB students and those born in Australia will be kept in mind when this variable is being operationalised for the NTU/CDU population.

Prior Academic Achievement in these studies has been specified as both an outcome and a predictor of educational performance, since it is embedded in the educational process from the early years and is a powerful mediating influence on later achievement and participation. We have seen, for example, that academic achievement at Year 9 may be the key to later participation for Indigenous students, and that it has also been closely associated with the other predictors such as gender and region. There have been several studies of trends in literacy in Australia, such as the National School English Literacy Survey (NSELS) (1996) which have identified literacy as a key vehicle behind educational inequalities, through its intimate association with class, race, region and gender. The NSELS found, for example, that girls outperform boys in all aspects of literacy such as writing, reading, speaking and listening and that the gender gap was greater in the lower socio-economic groups. This gender gap is also increasing, according to the research conducted by the Australian Council for Educational Research (Marks and Ainley, 1997), increasing from 3 percentage points in 1975 to 8 percentage points in 1995. There are regional effects as well, with some states clearly outperforming others.

Data provided from the *Boys: Getting it Right Report* (Table 4, p. 12) demonstrates the compounding of literacy outcomes with these other predictor variables to produce multiple sources of advantage or disadvantage. Across the extremes of the range of percentages of student in Year 5 who achieve a benchmark reading score, one might contrast ACT females (98.3 percent) with Northern Territory males (69.3 percent), a gap approaching 30%. While this gap is the result of a compounding socio-economic, regional, gender, and Indigenous status factors, it represents an enormous difference in the academic chances of the children involved and cannot be reduced to their direct and inevitable influences.

This compounding of disadvantage in the mid-primary school years, remote as it may appear to predicting outcomes at University level, has reverberating effects throughout the years of education and has been found to be a key predictor of later educational outcomes such as early school leaving. Differences in Year 12 retention rates, taken eight to ten years later in the life cycle, for example, are almost a magnified copy of the basic patterns of inequality in the reading achievement table, with the gaps even amplified (Table 3.1 below, reproduced Table 2.1 from the *Boys: Getting it Right Report*). Here the gap between ACT females and NT males has widened from 30% to 50%, indicating the doubling of the chances of Year 12 participation across these two extreme populations, complicated as they are by the later effects of remote location and Indigenous status.

Table 3.1 State and Territory Differences in Yr 12 Retention Rates by Gender*

Table 2.1

Sector	NSW		VIC		Qld		SA	
	Boys	*Girls*	*Boys*	*Girls*	*Boys*	*Girls*	*Boys*	*Girls*
Government	54.7	67.4	62.2	80.7	66.7	78	50.3	62.5
Non-Government	76.7	86.6	81.2	94.2	83.6	91.5	79.3	90.6
All Schools	61.7	73.5	69.2	85.8	72.4	82.6	59.2	71.8

Table 2.1 Year 12 Retention Rates by State and Gender, 2000 — *continued*

Sector	WA		Tas		NT		ACT	
	Boys	*Girls*	*Boys*	*Girls*	*Boys*	*Girls*	*Boys*	*Girls*
Government	60.2	72.4	62.2	77.9	50	68.2	100.1	109.7
Non-Government	77	88.3	65.2	72.5	27.2	35.2	64.1	60.8
All Schools	65.5	77.6	63	76.4	42.5	57	84.9	89.3

Source ABS, National Schools Statistics Collection.

*Reproduced Table 2.1 from the *Boys: Getting it Right Report,* 2002, p. 12.
(Note: rates are in percentages, but values over 100 are result of inter-state and inter-sectoral transfers not included in the base population numerator)

The pattern of causation of educational outcomes that emerges from this analysis of predictors is complex, but one in which the key socio-demographic predictors and their recent trends have been well documented. Apart from low socio-economic status of parents, foremost among the other predictors of disadvantage are male gender and Indigenous status, with non-metropolitan location forming an important background or contextual effect. Ethnicity and Non-English Speaking Background, surprisingly, are increasingly predictors of higher performance and cannot be considered as negative predictors in more recent cohorts. Academic achievement has a reciprocal effect, as an outcome and as an important catalytic or amplifying effect in the determination of chances of educational survival and later success. Academic achievement, particularly in basic areas of literacy and numeracy, may therefore appear as an important field for intervention, particularly for Indigenous students where it has been shown to have most effect in reducing racial inequalities. The impact of these background factors on the experience of university study, particularly in the first year, has yet to be examined, including the effect of age, which, by its very nature, has not been considered in the youth and school-leaver studies reviewed in this section.

(ii) Socio-Demographics and the First Year Student Experience

Since one of the main objectives of Common Units was to provide the foundation for later years of university study, the main determinants of student outcomes in this program may lie in the responses of students to their experience of the first year. Here the most relevant source of information is to be found in the report to the Committee for the Advancement of University Teaching, *First Year on Campus,* by the Centre for the Study of Higher Education, University of Melbourne (McInnis & James, 1995), the agency which was responsible for the external evaluation of the NTU/CDU Common Unit program (Baldwin & McInnis, 2000). This was an extensive project, based on a survey responses from 4028 students in 1994 across a sample of seven representative institutions, case studies interviews with 60 staff and 120 students and a survey of all Australian universities which investigated their programs and activities directed at first year students. This report therefore provides an important background study for identifying the attitudes, interests, experiences and needs of the first year student population in the face of its increasing diversity in age, modes of study, ethnic composition and course enrolments following the post-Dawkins expansion of the early 1990s.

The main finding of this investigation was that universities have failed to come to terms with the needs of this changing population and that, while the majority of students on-campus were "generally positive in outlook" (1995, p. x) there were many negative views of the experience in terms of teaching quality, student- academic staff interaction and the provision of diagnostic feedback There was also evidence of widespread disconnection of many students (over a quarter) from university life (extra-curricula activity and interacting with their peers), while "barely a half of the students surveyed found their subjects interesting" (1995, p. x).

These and related findings of widespread dissatisfaction and alienation among first year students were matched by a similar negativity among many academic staff. In a review of the contrast of the findings a 1978 survey of academic staff with a similar study carried out in 1993, the authors note that dissatisfaction with the academic quality of students "had more than doubled", with less than a third of the latter sample indicating satisfaction (p. 5). Sources of increased dissatisfaction were also identified as the demands of "too many students" (28 percent in 1993 vs 11 percent in 1978), coping with a much wider range of ability (46 percent vs 21 percent) and students lack of interest in the subject matter (28 percent vs 9 percent). The majority of academic staff responding (70 percent) disagreed with the statement that "students these days are less demanding of my time" and 74 percent agreed with the statement that ' most students only study those things that are essential to complete the course'.

This disjunction between student needs and staff perceptions in the changing environment of higher education was seen as "the cause of much dissatisfaction and frustration for both academics and students" (p. 5), a result in large part from the movement towards mass participation in higher education and the changing social and industrial context of academic work and the redefinition of the purpose of the first degree, whether as narrowly specialist or serving as a broad introduction to the learning necessary for career specialisation. Significantly this disjunction between student expectations and staff perceptions was lower in the older universities (p.5) which had been to some extent isolated from the sectoral reforms of the early 1990s. In a new university such as the NTU/CDU these observations have particular relevance, given the

diversity of its student population in terms of modes of delivery, age and ethnicity, Indigenous presence, and its vocational and course orientation.

Predictors of First Year Student Dissatisfaction

One of the main strengths of this report was its rigorous investigation of the dimensions and predictors of student satisfaction. Using advanced statistical techniques such as factor analysis, the authors constructed four scales derived from the thirty-one items on the student questionnaire that "related to students' goals, expectations and perceptions of the academic and social aspects of university life" (p.142). These four scales, with their defining items were respectively: Academic Orientation ("I enjoy the intellectual challenge of the subjects I am studying", Social Identity ("I really like being a university student"), Goal Direction ("I am clear about the reasons I came to university") and Academic Application ("I worked consistently throughout first semester") and were coded so that positive responses produced higher scores. Similarly, three scales were constructed, using factor analysis from the twenty-one items on the student questionnaire which related to "students' perceptions of various aspects of their courses" (p. 145). These factors were clearly defined as: Teaching (" The teaching staff are good at explaining things", Course ("Overall, I am really enjoying my course") and Workload ("My course workload is too heavy").

Student scores on the combined scales were treated as the dependent variable in a series of multivariate analysis of variance in order to estimate the effect of each of the following independent variables, grouped by their respective categories: age, sex, birthplace, course load, accommodation type, type of secondary school attended, number of parents with a degree, number of paid working hours, institution attended and field of study. Means for each category of a predictor variable were contrasted with those of the mean for the whole sample and with those of other categories (e.g. scores of under 19 yr olds were compared with those of 20-24 yr olds). Where there was a significant effect for that category, each of the scales was examined separately (p.145). The relevant findings for the purposes of this study are listed below.

A**ge** of students affected the combined scales of all seven dimensions at a significant statistical level. Using a contrast of means technique, students 19 yrs and under were found to have significantly lower means than 20-24 yr olds on the scales of Academic Orientation, Academic Application, Sense of Purpose, Teaching and Course. Students aged 20-24 were found to have significantly lower means than students on all of these scales, with the exception of Teaching.

Gender ("Sex") was a significant predictor of the combined scales. Female students were found to be significantly higher than males on scales of Academic Orientation, Academic Application, Sense of Purpose and Course.

Birthplace affected the combined scales, the Australian-born students found to be significantly higher than South-East Asia–born students on scales of Academic Orientation, Sense of Purpose, Course and Workload scales. However, an examination of the means from Table B.7 shows that Other foreign-born students had means either equal to, or slightly higher than, Australian-born students on scales of Academic Orientation, Academic Application, Sense of Purpose and Course, with slightly lower mean scores for Teaching and Workload.

Full-time/ part-time status ("Course Load") had a significant effect on the combined scales, with full-time students found to be significantly *lower* on scales of Academic Orientation, Academic Application, Sense of Purpose and Workload. Not surprisingly, full time students had significantly higher means for Student Identity.

Accommodation affected the combined scales at a significant level, with students living with their families having a significantly lower means on all of the seven scales when compared with those for the grand means. College-residence predicted significantly higher scores on Student Identity, but significantly lower scores for Academic Application.

Paid Work affected the combined scale, with students who worked 1 to 10 hours a week significantly lower on the Academic Application scale.

Type of University ("Institution") affected the combined scale scores, with students from the Regional University (C) having significantly lower scores on scales of Academic Application, Sense of Purpose, Teaching, and Workload. Students from the Applied University (E) were significantly lower on scales of Student Identity, Sense of Purpose, Course and Workload. Students from the Suburban University (D) were significantly higher on scales of Student Identity, Sense of Purpose, Course and Workload, while students from the International University (B) were found to be significantly higher on Academic Application and Sense of Purpose but lower on the Student Identity scales. Field of Study had a significant effect on the combined scales, but varied in its effects from institution to institution. Overall positive effects for Arts, Health and Education students were observed for Academic Orientation, Sense of Purpose, Course and Workload scales with mixed results for the other fields. When institution was controlled for, some of these effects, both positive and negative, were no longer statistically significant. The interaction with type of institution renders interpretation of this effect very difficult, but the gross differences suggest that, when sufficiently contextualised, this is an important influence on levels of student satisfaction with teaching and engagement with their course and university life.

Underlying patterns of relationship between these two categories of scale (Teaching, Workload and Course on the one hand, and Academic Orientation, Academic Application, Sense of Purpose and Student Identity on the other) were then computed by a canonical correlation analysis (which has been called elsewhere a kind of "double-barrelled factor analysis"). This analysis showed that students with higher scores on higher Academic Orientation and Student Identity were more satisfied with their course. Satisfaction with Teaching was also strongly related to this cluster or dimension. A second cluster indicated that students who had higher scores on Academic Application were more satisfied with their teaching, while scale loadings on third cluster or dimension suggested that students who had a greater sense of purpose were more comfortable with their workload.

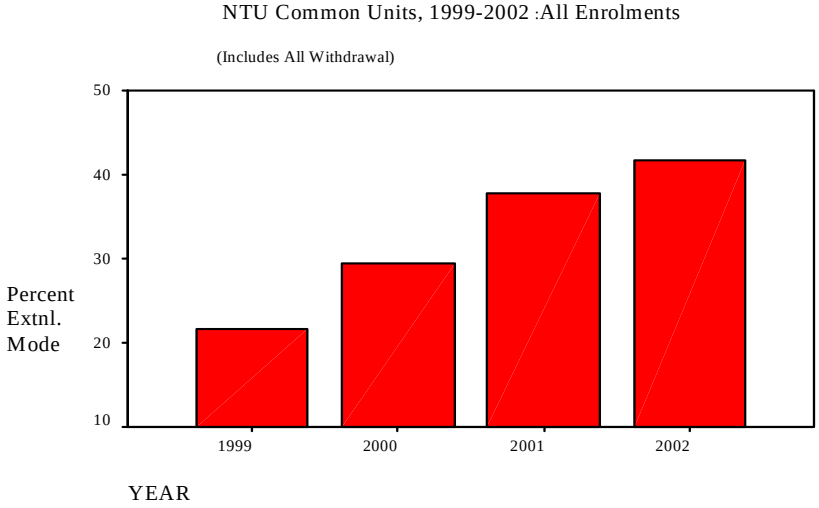
These analyses clearly identify the important predictors of the first year response. In addition to some of the more socio-demographic predictors such as gender and ethnicity/citizenship, age (particularly over 25 yrs) clearly emerges here as an important factor, along with the more situational and specific predictors such as institutional type, full-time/ part-time status, field of study. This Report, however, does have certain limitations for the purposes of predicting student outcomes in the Common Unit program. Due to its terms of reference, its focus was on on-campus students and consequently, off-campus enrolments and mode of delivery were not identified. There was substantial and recognised sampling bias to female and younger respondents, as well as a lower representation and response rate from newer and consolidate universities like the NTU/CDU who, together constituted only 23.4 percent of the surveyed sample of students. Mature-age students were significantly under-represented (only 12.3 per cent were over 25). This was true as well for part-time students in the total sample.

Interpretive difficulties arising from sampling biases in this Report are compounded by the lack of controls among the various predictors such as age and gender. In this Report, the separate effect of age, for example, has not been estimated net of its correlation with gender, or with some correlate from among the other independent variables. This methodological approach therefore distinguishes the methodology of this study from those reviewed in the previous socio-demographic section (i.e. Marks et al, 2000 and Considine and Zappalà, 2002). This problem points to a need to employ regression methods so that these effects can be clearly distinguished and their associations adjusted for. This study therefore leads us to explore in greater depth the influence of modes of delivery on student outcomes, as well as to apply more rigorous analytical methods to the available data from student response to the Common Unit program.

IV EXTERNAL STUDY AND MODES OF DELIVERY

The importance of the effect of the mode of delivery on the rate of passing a Common Unit was the main motivation of this Report. Higher rates both of withdrawal and of failure for students taking units in flexible or external delivery mode have been the subject of comment, though, till now, not of systematic analysis. The importance of this factor cannot be over-emphasised, given the upsurge in the proportion of units taken in the external mode across the NTU/CDU (from roughly 7% in 1996 to almost 25% in 2001) (Fig. 4.1). As expected, this increase has impacted on the proportion of students enrolling in Common Units in the external mode having doubled, up from 20 percent in 1999 to over 40 percent in 2002. This effect is due not only to the compulsory element, but also because many Darwin-resident and/or full-time students have taken advantage of this (external delivery) option.

Fig. 4.1 Growth in External Delivery



This trend is driven by the increase in external enrolments of Health Science and Education students in the late 1990's, together with the greater range of offerings in the external mode with CUC104 and CUC105 available in online delivery in Semester 0 of 2000 and 2002 respectively. However, these factors cannot account for all this increase, some of which must be attributed to the demand for non-face-to-face learning modes for large numbers of part-time mature age students who prefer this option for work-related or family reasons. Although this trend may have already peaked, it may yet represent a paradigm shift in the way that the university orients its teaching and learning technologies, particularly in units with large numbers of students, where the marginal costs of development are lower. These external modes are perhaps better termed "flexible delivery", since they encompass a mix of print and online and interactive learning (especially with use of email). However, the term "external mode of delivery" will be used here

for the sake of contrast with face-to-face or "internal mode" which is mostly, though not exclusively, delivered in lectures, workshops and tutorials by face-to-face methods.

The growth of external delivery modes of unit delivery has been particularly important for the development of the Common Unit program. As a compulsory element in the University degree, two units (CUC101, CUC102) were compelled to be available in external mode from the time they came on stream. The interaction between the two modes in terms of content, methods of assessment and relationship with the information skills components became inevitable. However, in the case of CUC101, as the content of some lectures and topics changed due to staff turnover during the first four years, the two modes tended to diverge so that a complete overhaul became necessary and the unit was relaunched in 2002. The format of the external materials tends to impose a certain rigidity on a year-to-year basis, given the time and effort required for revision and reprinting. Nevertheless, communication between unit coordinators and the external delivery function (Teaching and Learning Division) ensured student response and feedback was available.

Relationship between Modes of Delivery in the Common Unit Program The inter-relationship between the internal and internal modes of delivery in Common Units was supported by the membership of the Director of the Interactive Learning Division (ILD, now Teaching and Learning Division) of the Common Units Committee. Contribution from this Division were decisive in shaping the format of online units CUC104 and CUC105, as well as in the production of online resources (such as the Jabiluka website). The Internet was freely used in all externally offered units, in email communication with tutors and coordinators, as well as with other students through the Learnline communication facilities, Talkline/Discussion Board (also available to internal students). Specialised "chat rooms" were also provided for the online units. This active and close involvement of the external mode with the development and delivery of the Common Units gives this factor a unique, and often neglected, influence on the global patterns of student of student response to the program. Some problems remain, however, as the following review of the effects of technological access may demonstrate. These were particularly noticeable in the case of students in remote communities.

Technological Access and Attrition among Remote Community-based Students Attrition rates of students studying from remote locations are undoubtedly linked to problems with access to technology especially for online learning and library research components of study. Access refers not only to access to physical resources: libraries, computers, the Internet and appropriate bandwidths, but also the *skills* to access technologies and access to hands-on support.

The difficulties faced in accessing technologies, particularly by remote external students, are an ongoing issue and presents one of the greatest challenges to external online delivery. An ACCC (2003) investigation into broadband access across states suggests delivery in the Northern Territory is limited. However even where physical access is available, there are not necessarily the skills to utilise this. For example, on a recent visit to a remote indigenous community a CDU staff member (Sonia Smallacombe) observed surprisingly sophisticated computer technology but a poor skill base for using it. Anecdotally this appears to be a problem across a number of communities.

The lack of experience with computer technology is not restricted to Indigenous communities. Given that 67% of the NTU/CDU student population is over the age of 25, (Charles Darwin University, 2002) we have to assume that a number of our students will not have used computers in school nor necessarily been recruited into the computer age after leaving school. The new common unit CUC100 Academic Literacies goes a long way to address these issues in its computing component. However, for external remote students, hands on community training

and, for internal students, an awareness of the need for appropriate training and support might also be advantageous strategy. Technological challenges and a lack of adequate support in overcoming these are strong indicators for attrition.

This correlation between attrition and access to appropriate technology can best be explained with reference to Bandura's (1977) ideas of self-efficacy which explore the connection between perceptions of ability to succeed and actual success. Pajares (2003) explains, self-efficacy as "a view of human behaviour in which the beliefs that people have about themselves are critical elements in the exercise of control and personal behaviour." Thus where a student is faced with task which they perceive as threatening, unfamiliar and which they assume they will fail at the chances of attrition are high. Given that higher education student profiles have broadened in Australia and globally in terms of age, gender and socio-economic background, (Northedge, 2003), disparities in levels of literacy (including computing, researching and communicating) must be assumed and because of this students from these non-traditional groups begin their studies with problems with self-efficacy and, consequently, an increased chance of failure.

Estimating Delivery Mode Effects on Learning

The question remains, however, whether at least some of the higher rates of early withdrawal and of failure of external mode students may be a direct result of the mode of delivery itself, rather than to its intimate correlation with some other factor such as location and Indigeneity (as we have seen) or other factors such as age, first year of course, part-time status, or field of study. Again, might the lower rates of success and retention in this mode be the result of some unique combination of these factors, which may, in some cases be pulling in different directions, perhaps across values of the same variable. Might the external modes, for example, be beneficial for older female students, but not for older males? In other words, are student outcomes determined by the quality of the management and delivery format or with interest in its content? Can levels of satisfaction with the program predict academic outcomes? These questions will be explored in the face of the available evidence on Common Units in the following section and chapter. However, here we will examine the evidence whether non-face-to-face modes of course delivery exert an independent effect on student achievement and levels of satisfaction.

Overseas Evidence The most impressive body of empirical research on the effects of external modes of delivery on learning and student satisfaction comes from the United States and is associated with the "No Significant Difference Phenomenon" which began as a debate in the early 1990s initiated by Thomas Russell of North Carolina University and summarised in his review of empirical evidence in a book (1999) of the same title which has since gone through five editions, with regular updates. Russell came to the conclusion, after a detailed examination of 355 independent research reports, summaries, and papers going back to the late 1920s. His conclusion, in a nutshell, is the learning outcomes of distance learners are similar to, or better than, the learning outcomes for face-to-face or on-campus students. The "no significant difference" conclusion applies across all technologies – print-based, radio, television and video, as well as to the computer-mediated interactive modes (both time-structured/ synchronous and time-unstructured/asynchronous) made possible by the Internet and related digital media. The "no significant difference phenomenon" is also claimed to hold true for all types of content and all levels of instruction. The summaries of the studies which are reviewed and constantly updated at http://teleeducation.nb.ca/nosignificantdifference. This resource provides a rich source of findings, stretching back over many decades, that support Russell's conclusion.

While Russell's conclusion that off-campus technologies and modes of delivery make "no significant difference" to learning outcomes appears to have been accepted by many influential

authorities across the tertiary and secondary sectors in North America, it has been rejected or criticised by many others. The grounds for dissent fall into five main categories: substantive, methodological, philosophical- analytical, left-critical and post-structuralist):

Substantive Since Russell's conclusion has attracted supporters or his position, recent evidence on which he draws has been held to be highly selective. There is alternative sister website, http://teleeducation.nb.ca/significantdifference, which lists several studies in each year going back to 1975. This is also monitored by Russell and reports studies showing that modes of delivery do indeed affect learning outcomes. These effects are contradictory, with a balance between those which indicate the superiority of traditional methods and those which make claims for the beneficial effect of a variety of computer-mediated delivery. Though not as impressive as the mass of studies that support Russell's original conclusion, these nevertheless lead one to doubt the generality of the "no significant effect phenomenon".

Methodological One of the most trenchant critiques of the literature in this area, which may explain its range of disparate and inconclusive results, comes from the methodological review for the Institute for Higher Education Policy of the National Educational Association by Phillips and Merisotis (1999). These authors note the relative paucity of good, original research among the many studies cited by Russell and the large amount of cross-referencing among them (he recognises this) and then proceeds to critique the methodological basis of the small number of original studies. They claim a number of deficiencies among the case, survey and experimental work done in this area on the grounds that in almost all the studies:

- There was insufficient control for the extraneous variables (socio-demographic such as age and sex, and learning-related, such as levels of motivation or of peer collaboration)
- The subjects were not randomly selected or assigned to the different delivery conditions (related to the lack of adequate controls)
- The instruments purporting to measure reliability and validity of the outcomes (grades, attitudes towards learning and satisfaction with the course) were not submitted to rigorous tests for reliability ("Do they yield consistent results?) or validity ("Do they actually measure what they purport to?")
- Their research design did not take account of "reactive effects" such as the "Novelty Effect" generated by a new approach or the "John Henry Effect" which refers to the extra effort expended by the defenders of traditional methods who tended to constitute the control groups.

Philosophical- Analytical The lack of methodological rigour in these studies may in turn reflect a more logical and philosophical confusion about the relationship between technology and the learning process. Is the method of delivery merely the vehicle by which learning takes place, or is it a constituent element of instructional communication, inextricably connected to the learning experience? The debate over this issue, which has resonances with McLuhan's famous "the medium is the message" aphorism from the 1960s, is well summarised by Joy and Garcia (2000). These authors support the case of Richard Clark (1994), that research studies have been premised on the assumption that different media are somehow the agents of instruction, rather than merely vehicles by which motivational and cognitive processes are stimulated, activated and mobilised.

Research will therefore never be able to demonstrate any significant differences between modes of instruction if it does not control for differences in these fundamental processes which may, in theory, be achieved by any external medium. Because these studies have not been controlled for these differences in effect, it is therefore not surprising that they do not show any systematic

superiority of one method over another, particularly when they neglect to control for so many other confounding factors which may impinge on these central communicative processes. The "no significant difference" issue, therefore, will remain unresolved, unless it is recast in terms which address the pedagogical, rather than technological, factors which influence learning outcomes.

Left-Critical The argument that learning is not embedded in technology but in the human communication is at the heart of many critiques of the new technologies of instruction, and the reasons given for their apparent abandonment after a wave of enthusiastic adoption in the mid to late 1990's. The case against the vogue for computer-mediated and Internet-based delivery is made perhaps most strongly by Tara Brabazon, whose book, *Digital Hemlock: Internet Education and the Poisoning of Teaching* (2002), rises out of her experiences as a lecturer in Cultural Studies at Murdoch University, responsible for both face-to-face and online courses in her area. Brabazon's critique may be used here to represent this position. While these critics accept the analytical insight that effective learning is not determined by the medium instruction, they reject the converse proposition that the medium is, as a consequence, necessarily a neutral and innocent vehicle of knowledge transmission.

Brabazon (2002) and others who adopt a left-critical position (eg Peters and Roberts, eds. 1998; 2000) see in the displacement of pedagogical issues a kind of managerialist power-play driven by the logic of market forces and their attendant pressures to cheapen and deskill academic labour. These critics are therefore highly suspicious of the advantages claimed to be inherent in the new technology, namely that it is: (a) democratising and emancipatory, because it is student- rather than teacher-centred; (b) asynchronous (can be accessed and structured in student's own time, at student's own pace); and (c) interactive (turns student into an active participation rather than a passive consumer in the learning process). Against these claims, the critics argue that computer mediated learning is (a) always instructor-dominated and instructor-assessed; (b) highly time-structured in that students are still required to complete tasks either online or by fixed dates and (c) highly circumscribed in interactive terms because of the way materials are selected and inter-linked.

In sum, these critics argue that if students are positioned as consumers of educational products (as the neo-liberal philosophy would have it), they can never be actively and creatively involved in learning, a process which requires the uncertainties and disruptive possibilities inherent in the live, embodied exchanges that are situated in real (rather than "virtual") communities. Pedagogic applications of the new media which reduce the teacher to "content provider" and the student to "consumer" can only, these left-critical proponents claim, be an instrument of further alienation, just another example of what neo-Marxists see as the commodification of knowledge inherent in the cultural and reproductive processes of late capitalism.

Post-structuralist There are other critics (reviewed by Tyler, 2001), however, which are neither so celebratory nor so pessimistic about the uses of computer-mediated and Internet-based learning. These critics argue that the medium of hypertext communication exerts a new kind of relationship between teacher and learner which is neither inherently emancipatory nor latently repressive. The invention of cyberspace, they argue, creates a different realm of pedagogic communication which is relatively autonomous from conventional pedagogic forms of the classroom, as well as from the forces of political economy. Indeed so powerful are these newer forms of electronic communication, they argue, that they have the potential to reconstitute the institutions which they inhabit.

Drawing from the insights of models of the "knowledge society", these critics see the new forms of communication dislocating industrial formations of class, nation state and institution which have traditionally underpinned the power relations of the traditional university. At the heart of these models are what has become known as "post-structuralist" and "post-modernist" theories of social and cultural change (Eagleton, 1996, pp.).These theories claim that communicative and cultural processes in advanced industrial societies, through their reliance on electronic mediation, are becoming increasingly disconnected from the social order. As a result, the search for stable systems of meaning within the "grand narratives" of progress, whether they are from left or right of the political spectrum, is becoming increasingly problematic, if not misguided. Tyler (2001) applied some aspects of this framework in a critical study of the Jabiluka Mine Online Educational Resource website, developed specifically for the Common Unit, North Australian Studies (CUC101). He concluded (p. 357-8) that a recognition of the similarities between hypertext-based learning and the communicative principles of mass culture will lead us to look beyond the surface features of the new media and to exploit their potential for developing a critically-informed pedagogy for the "information age".

Australian Evidence Since the evidence reviewed so far is largely from the United States experience, it may be useful to examine some of the results from studies carried out in Australian universities. These tend to originate in the newer or less traditional universities, which have invested most in external delivery in the competition for student markets, both at home and abroad. Unfortunately as we shall see, the same problems afflict these studies as in the case of the American studies – lack of adequate controls, economistic rather than pedagogic in orientation, inadequate instrumentation and poor research design. Nevertheless, the interest in the new methods of course delivery have sparked something of a revolution in the thinking of Australian universities, with whole new sections devoted to online and remote delivery, a plethora of new positions in web design and course development and the emergence of institutional networks and consortia which involve even the older universities. Although this movement, as Brabazon has well documented, has been met with some disillusionment and stalled progress, it has forced many educators to consider new approaches to the development, marketing and delivery of educational services.

Despite the amount of investment in these initiatives, it is perhaps surprising to discover how little effort has been put into original and rigorous research. Student surveys and simple research designs predominate, and it is difficult to extract from these even the basis for a debate which approaches the sophistication of the US example. Most studies have been evaluative and managerial in orientation rather than located within a specific social scientific discipline. Typical perhaps of this kind of research is a fairly early evaluation carried out by Taylor and White (1991) on the cost effectiveness in four new units of multi-media mixed-mode instructional packages at the University of Southern Queensland over the 1987-9 triennium. These packages were available to internal students as an experiment and included a wide range of teaching methods, with varying proportions of print, electronic media and face-to-face contact (between 20 and 28 hours).

Taylor and White found that "while there is a positive acceptance of instructional packages by on-campus students, it should not be overlooked that many students place a good deal of importance on the conventional approach to on-campus teaching based on lectures and tutorials" (p.25). The pass rates from these units were superior to those of external students in the same units, a finding that was explained in terms of the "typically part-time status" of off-campus students. The authors recommend that, in light of the positive reception of the packages by students, that "mixed-mode methods are worthy of further development, provided the financial costs associated with such an initiative are not prohibitive". While this study no doubt does what it sets out to do, namely perform limited evaluation of an innovative method of instruction, there

has been no attempt to subject the findings to the elementary conditions for evaluation, which would have included an on-campus control group, random assignment of students to the various instructional conditions (traditional, mixed mode and external/ print) and some monitoring of consistency in assessment across an agreed and common measure of achievement.

Of more relevance, perhaps, are more recent studies of student satisfaction at Murdoch University, whose Foundation Unit program most resembles that of the Common Units and whose distance learning environment resembles that of the NTU/CDU. The student survey data from Murdoch also provides an interesting counterpoint to Brabazon's impressions of student disengagement and alienation from the newer methods of course delivery, based on her own teaching experience at the same university in the late 1990s. The following table (Table 4.1), comparing internal and external students' responses to the Murdoch University Foundation Units program, reconstructed from two separate tables of web-published results, reveals some interesting differences. Since these results were based on quite a good response rate drawn from a high number for internal students (n=957), one may conclude that there would appear that the responses of external students were significantly more favourable.. The difference between the composite mean score for each group is 0.32 (3.16-2.84), which is more than three times its standard error of .09.

The higher level of positive responses from external mode students is highly significant ($p<.001$) and is consistent throughout the scale items, with the exception for the "opportunity to give feedback to staff" (item 11), where there was a non-significant difference in favour of internal students. The greatest differences are for clarity of student expectation (item 1 "It was clear what I was expected to learn in this unit") and the global quality evaluation of (item 14, "Overall, I was satisfied with the quality of this unit"). Also important are the large differences in relevance of learning activities and of assessment method to enhancing the understanding of the subject area (items 5 and 6). All the differences, however with the exception of item 11, are statistically significant at the .05 level, while most are significant at the .01 level and the case for the superiority of student satisfaction of the external mode in terms of a wide range of relevant areas of subject matter, teaching quality, communication of goals, assessment, workload, resources and staff accessibility.

Table 4.1 Results of Student Evaluation Survey of Foundation Units, Murdoch University Sem 1, 2001[#]

Questionnaire Item		Internal Mean* (N=957)	Internal Std. Dev.	External Mean* (N=76)	External Std.Dev*
1	It was clear what I was expected to learn in this unit.	2.52	0.83	3.20	0.57
2	The assessed work was appropriate to the learning objectives.	2.90	0.67	3.26	0.53
3	The work I submitted was marked and returned in a reasonable time.	3.29	0.62	3.45	0.60
4	The feedback on my marked work was useful.	3.14	0.72	3.51	0.61
5	Activities in this unit enhanced my knowledge and/or skills subject area.	2.84	0.80	3.27	0.65
6	The assessment tasks tested my understanding of the subject area, rather than just my memory.	2.94	0.72	3.38	0.59
7	The workload was reasonable.	2.64	0.84	2.86	0.74
8	The unit resources directed me to other information sources, eg books, journals, web pages, etc.	2.83	0.72	3.18	0.64
9	The unit resources were well organised and easy to follow.	2.85	0.74	3.11	0.62
10	Staff were adequately accessible outside classes/to external students.	3.01	0.74	3.18	0.75
11	During the unit I was given an opportunity to provide feedback on the unit to staff.	2.91	0.74	2.89	0.83
12	I was given information on changes made to the unit in response to feedback from (past or current) students.	2.30	0.79	2.50	0.76
13	Overall, I was satisfied with the quality of teaching in this unit.	2.94	0.77	3.19	0.67
14	Overall, I was satisfied with the quality of this unit.	2.68	0.89	3.21	0.63
	Average Score	2.84	.76	3.16	.66

[#] Based on web pages at www.tlc.murdoch.edu.au/eddev/evaluation (accessed Sept 21st, 2003)

*A high mean value indicates higher student satisfaction. Internal response rate = 57%, n=957 responses (6 units); External response rate= 53%, n= 76 responses (3 units)

The apparently higher levels of student satisfaction with the external mode of delivery among student at Murdoch would not be inconsistent with other studies. However, it certainly raises issues from the rather negative accounts of on-line learning and Internet –supported learning which Brabazon draws from her own experience at this university. However, the crucial difference here may lie in the degree of digitally or online content which formed part of the course delivery. In the Murdoch context, there have apparently been a number of complications in the move to put all courses online through the WebCT platform, as well as some student preference fors print and hard copy materials (particularly for course readers). The following table (Table 4.2), reproduced from a student survey as part of the Report of the Academic Council Working Party on External Studies and Flexible Delivery (March, 2002), indicates that the online delivery as a single model is definitely a minority preference (13%).

Table 4.2 Preferred Form of External Mode Unit Materials#

Hard Copy	117	43.5
Complementary on-line	41	15.3
Combined hard Copy + On-line	38	14.1
On-line	35	13.0
Good as they are	24	8.9
Like Audio Tapes	14	5.2
(Some respondents didn't respond; some gave more than one response).		

#Results of Student Survey, Murdoch University, 2002

The relationship between the medium of delivery and the mode of delivery is a complex one, since not only did these external students express a general preference for hard copy and/or complementary on-line support, but there was also a demand for a videotaped version of internal lectures. Online tutorials were also heavily supported. It would appear then that the attempt to align virtual/ real with an external/internal dichotomy is not a tenable one. Students appear to prefer traditional or mixed media rather than pure online delivery and, if available, some simulated version of the internal tutorial experience. The radical option of restructuring the university as an online or virtual campus, with high levels of asynchronicity, interactivity and student centredness would seemed doomed to meet student resistance. Brabazon's critique of the digital revolution seems therefore well targeted, particularly in light of the millions of dollars spent by high profile universities in the U.S. and the U.K. on failed experiments which have led to the closure of their online divisions. There would appear to be some truth therefore in Brabazon's claim that: "What regulators and governments did not recognise is that students quite rightly want 'the university experience' of intense debate, social interaction, drinking, dancing and profound, life-changing learning' (2002, p. xi).

The collapse of the false dichotomy between virtuality and off-campus delivery still leaves open the question of the relationship between internal students' access to more flexible modes of learning and the search for methods which are tailored to the varying student situations and needs. The Murdoch Working Party Report, cited above, takes up this challenge by recommending a "cultural shift" in their University, towards a convergent method of unit delivery which integrates all modes of delivery and media of instruction under a single "flexible delivery" umbrella. Under this model, students would access unit content through various formats and modes of enrolment (subject to DEET regulations of costing and subsidisation):

> In our discussions of what flexible access and delivery methods might mean we came to recast the emphasis on *delivery* methods (i.e. modes) and instead think about it in terms of *accessing* the content, information and learning experience of units in different ways. That is to think of the *unit* as a package that allows a variety of access points and ways of using the unit's resources. (Murdoch Academic Council Working Party on External Studies and Flexible Delivery Report, Paragraph 4.2.1).

By blurring the distinctions between internal and external modes of delivery, as well as between face-to-face and online forms of instruction, this model presents a radical alternative to traditional university practices of teaching and learning. Academic workloads, staff-student relationships, assessment methodologies and support mechanisms are all deeply implicated in such a shift. If it presents an institutional response to the destabilising effects of the past decade which have been more economic and political rather than pedagogic and professional, then it needs to be scrutinised in terms of its likely effects on learning outcomes as well as on student demand and cost structures.

What then, can the pedagogical literature, and in particular the "no significant difference" debate add to this debate. Is any evidence about the relationship between modes of instruction and of course delivery and student outcomes so inconclusive, so poorly based, so interest-driven, that little can be said in the face of such a radical move towards the flexible delivery model proposed for Murdoch (also over the year, a topic of debate in the NTU/CDU Common Units Committee). There are some important lessons to be taken from this literature, namely that (a) technological innovation cannot compensate for good pedagogic method (b) until its pedagogic principles have been established, the promise of the "virtual classroom" will not be fulfilled (c) student demand for online delivery as a single medium is relatively weak (d) traditional forms of print-based delivery will remain popular, as well as face-to-face learning (e) student needs have become diverse and varied so that the "one size fits all" model of instruction should evolve into a more flexible, individualised form , guided by close monitoring of their learning processes and outcomes.

The final word in this debate could well be supplied by Russell, who has done more than anyone else to stimulate and to focus debate on the modes of delivery in a more systematic way than any other commentator. Ironically, perhaps, in light of the resistance to alternative methods catalogued by Brabazon and others, the move towards flexible delivery may provide an opportunity for transcending the simplistic oppositions which have structured this literature. Russell, in a comment on the "technology wars" makes a plea for a "multi-technological" approach which, in formal terms, looks a lot like a well-developed system of flexible delivery:

> To achieve a multi-technology approach to teaching, we must (after identifying the groups of individuals and their particular methodological needs) revisit many of the older technologies such as radio, television and videotapes to ascertain their viability for specific student populations. Rather than abandoning these tried-and-true instructional tools, educators must take the time to evaluate students' learning types, and match the technology used in their instruction accordingly. In the rush to embrace the new and admittedly often more exciting

> technologies, there has been a tendency to ignore the techniques pioneered by the earliest distance learning practitioners. In fact, there will likely always be a substantial number who can benefit from the earlier tools. Each of these tools has unique characteristics that can be used to tailor the lesson to the needs of the individual learner. (Russell, 1997)

The extent to which these principles can be generalised throughout all present modes of delivery, internal as well external, given the limited resources which Australian universities now have to hand, remains to be seen.

V STUDENT SATISFACTION: SURVEY RESULTS

How do the factors which shape student outcomes, as identified in national and institutional studies, affect student satisfaction and performance in the NTU/CDU Common Units? While there has been a degree of scrutiny of this program at the local level, there has been little systematic attempt to integrate the various bodies of evidence from internal and external evaluations with the wider literature on student outcomes. In this section we will look at some of this evidence in greater depth in light of these more general issues of academic process and student response thrown up by the literature. These will provide a local focus to these debates which will be developed into lines of enquiry that will inform the methodological framework for the empirical investigation in the following chapter. The evidence here will be drawn from both (a) the 1999 "internal" survey of all students, internal and external, who participated in the program over its first four semesters of implementation from Semester 1 1998 through Semester 1, 1999 and (b) the "external" survey carried out in the second semester, 1999 of all participating students, both internal and external, in that semester[2]

Internal Evaluation Survey, 1998-9

Early in 1999 an adaptation (Q-UMEF) of the standard Teaching Evaluation (TEVAL) form was developed by the former Teaching and Learning Branch (by Greg Shaw) specifically for the Common Unit program. This questionnaire was sent out to all current and past (i.e. since 1998) students towards the end of the first semester. It consisted of forty items on a *proforma* questionnaire to which students responded by marking Strongly Disagree, Disagree, Neutral, Agree and Strongly Agree (reverse coded 1 to 5 in that order[3]), accompanied by standard demographic items such as gender, age group (in four-year intervals), overseas status, ESL and location. This questionnaire covered areas of unit management and delivery, content interest and relevance, fairness of assessment, practicality and relations with other students and tutors. This form was mailed out to all students, past and present, who had participated in the program since Semester 1, 1998. The response rate of 25% (n=297) to this survey provided valuable, though perhaps biased, indications of student satisfaction with the early stages of the program. The summed results of individual student scores over the forty items (where 120 represents and average neutral response) are displayed in Fig. 5.1 below.

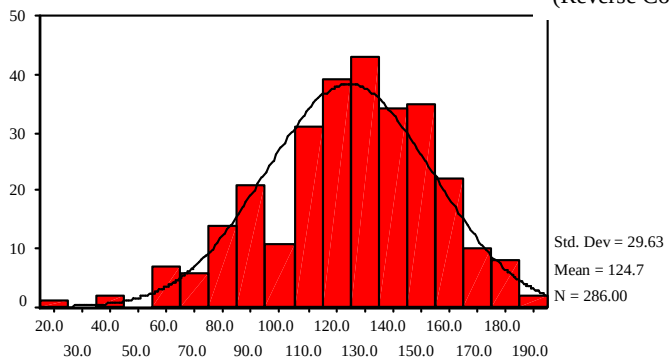
[2] See Appendix

[3] Note that the original Q-UMEF were reverse-coded, so that higher values reflected higher levels of student satisfaction

Fig. 5.1 Histogram of Student Student Satisfaction

Internal Survey of Common Units 1998-9

40 items scored 1 (lowest) through 5 (highest) satisfaction (Reverse Coded)



Student Satisfaction Score Summed over 40 items

To ensure that these scores represented a single dimension or property, all forty items were first submitted to a scaling procedure (reverse coded so that higher scores reflected higher levels of satisfaction), which yielded a high value for internal consistency (alpha = .9548, n= 226, listwise). The distribution of the summed scores therefore represents a reliable indication of the global satisfaction of the respondents with the program as a whole. Here the average score on an item falls in the "neutral" zone, at just over 3 on the 5-point scale (3.17, Table. 5.1). An estimate of the upper limit of the population value (mean plus or minus about .14) would still put it well within the "neutral" range.

While these estimates of average satisfaction levels are useful, the way the scores were distributed around these central points can be just as revealing of the shape of the overall student response. Here the results are more positive, as there appears to be a strong (and statistically significant) tendency towards the more upper response range (skewness = -.486 or >3 times its standard error). Visually, too, we can see that the histogram "leans" to the higher scores. Overall therefore, since this tendency is so statistically significant - and therefore unlikely to be the result of sample bias - it would be reasonable to conclude that this survey shows a noticeable tendency towards a positive rather than a negative response to Common Units. While this may not be a greatly encouraging result, it nevertheless indicates that the program, for all its teething problems, appears to have been accepted positively by the bulk of students.

Table 5. 1: Results of Student Survey 1998-9: Item Analysis (n=226)

		(Reverse Coded, Higher Values= Higher Satisfaction)			
		Mean	*St. Dev.*	*Item/Total Correlation*	*Factor Loadings*
1	I understood the standard of work expected of me in this unit	3.59	1.07	0.52	0.567
2	The unit developed my problem-solving skills	2.87	1.15	0.72	0.738
3	The unit content was presented clearly	3.33	1.14	0.68	0.721
4	The workload on this unit was not too heavy	3.50	1.06	0.41	0.449
5	The topics on this unit were generally interesting	3.19	1.37	0.66	0.683
6	The unit material gave me a clear idea of what I had to learn	3.19	1.10	0.71	0.744
7	I received detailed comments on my work	3.16	1.22	0.64	0.66
8	To do well in this unit requires hard work	3.41	1.06	0.28	0.277
9	I was encouraged to work collaboratively with others on this unit	3.18	1.33	0.49	0.506
10	Practical tasks were relevant to my learning	3.20	1.37	0.64	0.653
11	The unit helped my improve my communication skills	3.16	1.19	0.71	0.735
12	The unit assessment was focussed on deep understanding rather than reciting the facts	3.48	1.10	0.55	0.569
13	The unit helped me to improve my oral communication	3.11	1.29	0.61	0.638
14	I was generally given enough time to understand the things I had to learn	3.21	1.06	0.51	0.569
15	The way the unit was taught recognised my existing knowledge and skills in the area	3.06	1.21	0.58	0.624
16	There was a good balance between theoretical knowledge and practical education	3.03	1.16	0.62	0.651
17	I gained a clear understanding of the subject theory in this unit	3.11	1.13	0.74	0.771
18	Practical tasks were interesting	3.30	1.41	0.54	0.556
19	I was challenged to think in this unit	3.42	1.12	0.70	0.707
20	The materials in this unit were well matched to the unit learning outcomes	3.34	1.09	0.70	0.736
21	Activities in this unit directly helped my learning	3.04	1.09	0.80	0.819
22	There was a good choice and range of assessment questions in this unit	3.43	1.14	0.74	0.769
23	The assessment in this unit was fair and reasonable	3.65	0.95	0.57	0.61
24	The unit structure helped me to organise my work	3.14	1.09	0.70	0.727
25	I was able to cope with this unit	2.12	1.16	-0.21	-0.245
26	My results in this unit were the best I could achieve	2.81	1.28	0.16	0.163
27	I felt that the assessment I received for each task accurately reflected my learning	3.22	1.02	0.54	0.555
28	Interaction and involvement with others was a	3.26	1.35	0.48	0.495

	feature of this unit				
29	I felt comfortable making comments about unit content to my teachers	3.30	1.24	0.57	0.6
30	The unit was generally more difficult than other units in the course I am doing	2.41	1.15	0.06	0.0424
31	Assessment feedback was clear and informative	3.25	1.12	0.61	0.633
32	As a result of my experience in this unit I am more able to undertake other units	2.84	1.28	0.70	0.718
33	I could easily contact staff if I had a problem	3.29	1.15	0.49	0.522
34	Tutorials helped my learning and understanding	3.64	1.39	0.66	0.688
35	This unit was well organised	3.24	1.18	0.68	0.716
36	I am glad that I undertook this unit	2.83	1.44	0.77	0.794
37	Overall I am satisfied with this unit	2.84	1.32	0.84	0.86
38	Info skills I - generally satisfied *	3.22	1.19	0.61	0.634
39	Info skills II - practically useful *	3.37	1.24	0.65	0.674
40	Info skills III – helped me with my study *	3.12	1.23	0.62	0.645

*Precise wording for the three Infoskills items 38 – 40 was not available

An item analysis as set out above (Table 2.5) proves instructive in targeting the areas of greatest satisfaction or of dissatisfaction, as well as the items relationship with the individual's total score for the scale. Here we see that highest scores are for assessment-related items (item nos. 8,12, 23) student's understanding of the standard expected (item no. 1). None of these average an overall "agree" however. Negative or lower scored items were related to student's ability to cope with the unit (item no. 25, at 2.12 - a "disagree" average), difficulty compared with other units (item no. 30, at 2.4 also a slight "disagree" average) and ability to undertake other units as a result of this unit (item no. 32, just below neutral at 2.8). Significantly the item-total correlations and the factor loading of both the "coping" and the "more difficult than other units" had negative or zero values respectively, indicating that they did not belong to the scale. The apparent contradiction here between an inability to cope with the unit and not finding it more difficult than other units needs further explanation. It may indicate that while the content was difficult to handle, the assessments were generally in line with other units in the parent course. Content issues have, however, been addressed in later revisions of these four units, and is unlikely that the coping item would attract the same mean.

Predicting Satisfaction with the Program How was the program accepted by specific groups on the basis of such variables as age, gender, location or aboriginality? This kind of breakdown of student response was not, unfortunately, carried out at the time of the original analysis, as the interest was more in terms of responses to individual units. A further analysis along these lines may therefore provide some basis for identifying the possible socio-demographic and situational predictors of student outcomes. This kind of comparative analysis has the advantage of not being subject to the kinds of sampling biases that may affect the single variable analysis of Fig. 1. In order to test whether some of the significant predictors of student outcomes identified by the literature such as age, gender, mode of study and Indigenous identity, were operating at the local level, an exploratory analysis was carried out for this review.

An analytical procedure chosen for this purpose was that of linear regression (Ordinary Least Squares), in order to explore the relationships among the predictors of a student's response to this internal survey. While a more exhaustive explanation of regression procedures is given in the following chapter, it is sufficient for these purposes merely to identify those variables, or

combinations, which may affect student outcomes. The advantage of this procedure at this stage is that it provides an estimate of the independent effect of these predictor variables, while the other variables are "held constant" at their average values. At present, this model omits "interaction effects", that is to say, the unique combinations of predictor values (e.g. over fifty age group and female gender) which may predict satisfaction levels. These can be quite important and more systematically explored as well in the follow chapter. In order to eliminate the effect of partial responses and to ensure that the scale is measuring one dimension of satisfaction, the dependent variable used here were scores for a first principal component which explained just over 40 percent of the total variance in the scores. The factor scores for each individual are therefore the composite of the weighted values for each item, and therefore adjusts for the varying contributions which each makes to the factor.

Table 5.2 Results of Regression Analysis from Student Evaluation Survey[a] Common Units 1998-9

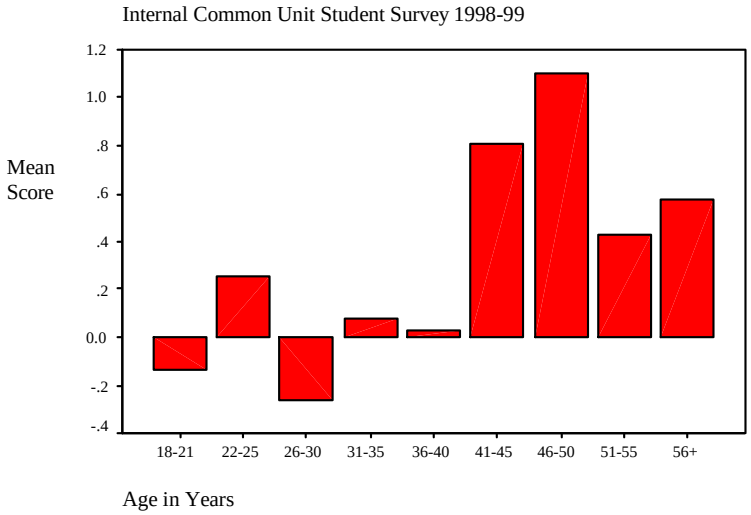
	Unstandardized Coefficient		Standardized Coefficient		
	B	Std. Error	Beta	t	Sig.
(Constant)	-5.852E-02	.609		-.096	.924
FEMAL	8.488E-02	.171	.037	.497	.620
INDIGE	-.422	.450	-.070	-.937	.350
OVERSEA	.232	.308	.059	.753	.452
NONENG	-.486	.231	-.164	-2.104	.037
EXTERNA	.231	.198	.092	1.169	.244
AGE	.125	.039	.239	3.175	.002
LOCATIO	.107	.184	.046	.583	.561
TIME	8.498E-02	.060	.109	1.424	.156

Dependent Variable: First Principal Component of 40 items (expl. 40% of variance)

This overall satisfaction factor was then regressed on a number of predictors: gender (being female), Indigenous status, Overseas Student, Non-English-speaking background, Mode of Study (external), age (ten age groups in four-year intervals) and location (Darwin=1, Darwin Rural = 2, Other=3) and Time, coded from 1 to 4 for each of the four semester in which the units were available. The results are displayed in Table 5.2. This table clearly shows that there are only two predictors whose significance level reaches the .05 level. These are Non-English-Speaking Background which has a low negative effect on satisfaction (β=-.164) and Age, which has a moderate positive effect (β= .239). The beta values (which can range from –1 to +1) for all the other effects hover at about zero. This is quite an interesting outcome in that it (a) confirms the importance of age for predicting student satisfaction, as found in several other studies (including the external evaluation survey below), and (b) a difference between overseas citizenship (birthplace) and linguistic background. This is important, since it seems to contradict the positive effect of NESB found in the socio-demographic studies on academic performance. Since these larger studies were based largely on second-generation immigrant families, the distinction between birthplace and NESB in the Common Unit program, where the ethnic and citizenship mix is probably much more divers, would appear to be important.

The independent effect of age may deserve some further scrutiny. Fig. 5.1 shows the distribution of the mean satisfaction factor score variable for each of nine age groups. This effect of age is by no means constant, nor can it be simply divided at 25 yrs. Although the under 25 yrs groups are generally negative, the 22-25 group is distinctly positive. This group could be broken down by gender and Indigenous and Overseas status, as well as for mode of delivery, to reveal the effect of each of these on this seemingly 'deviant' age group. It is also interesting to note that the satisfaction levels for the over 25 yr groups do not become significantly positive until they reach the over 40s, and then begin to decline a little thereafter (note that these older age means are based on much smaller numbers and should be treated with caution). However, if nothing else, this analysis demonstrates the need to be open to the varying effects of one variable on another, and the importance of examining interaction and non-linear effects, wherever possible, in order to avoid blanket judgements on crudely-aggregated groups.

Fig. 5.2 Mean Overall Satisfaction Score by Age Group



External Evaluators' Survey, 1999

The Evaluators' Report on the Common Units at NTU/CDU (Baldwin and McInnis, 2000), identified a number of factors in the student perceptions of the program, all of which have implications for student performance. A specially-commissioned student survey for this report (pp. 23-26 and Appendix 1) was carried out at the end of Semester 2, 1999, based on responses from internal mode students in CUC103, CUC104 and external mode students in CUC102, n= 181. Negative student responses from the questionnaire were traced to the element of compulsion of the program and to its perceived lack of content relevance to the student's major field of study. Perceptions of individual units were mixed, though more positive than to the program as a whole.

The external evaluators recommended that the purpose and goals of the program be better communicated to students, that it be more adequately and consistently documented, and that the skills and the subject matter component be better integrated at all levels – within individual units within the program as well as between Common Units and the University's degree programs. Many of these problems were addressed in the following years, and the focus of the program has,

as we have just seen, been considerably sharpened through the twin emphasis on skills and regional relevance in separate units. Resistance to the compulsory element will no doubt persist, and will probably be a key structural factor in explaining at least part of the differential success rate.

Because this Evaluation Report had a clear strategic and management orientation, it was not concerned with the situational or socio-demographic predictors of attrition rates. The student survey did, however, deal with outcomes relevant to student satisfaction, and potentially, to success or performance. These included:

- agreement with the idea of the common units program
- whether the unit was worthwhile
- whether the unit was a waste of time
- whether the unit was irrelevant to major study interests
- enjoyment of the unit

The evaluators reported that there were no statistically significant differences on these key items in relation to sex, fee status, language background, or whether or not students had decided on a career. They did, however, find some significant differences in relation to major course of study, Aboriginality and Age (pp. 84-5, 2000). Science students had the lowest agreement with the statement that the program is a good idea for all undergraduates (2.75 on a five point scale), compared with 3.41 for Business/Economics students, 3.17 for Education and 3.3 Arts). Aboriginal students (7 only) were more polarised, with positive responses concentrated in CUC104 and the negative in CUC102 (sampled externally only, with a lower response rate) and in CUC103.

Age differences (coded into two groups, under 25yrs and 25 yrs and over) produced the most consistent pattern of differences (averaging about .5 on the five point scale) with the older groups showing the more positive response on each of the five key items. The largest 'age gap' was in response to the item "I found this unit a waste of time", where the mean score of agreement for under 25yrs was 3.14, compared with a mean of only 2.11 for 25yrs and over. While there were some external students in the sample, their representation (n=23 or 13%), as well as their response rate (30%), was too low to yield valid statistical estimates of the effect of mode of delivery on student perceptions.

Despite the low numbers of external students, the mode of delivery nevertheless seems to be an important influence on student satisfaction in the 1999 evaluation of the Common Unit program. These evaluators point out that their survey of CUC102 students (external only) confirmed the comment of the lecturers "that the issues associated with the external form of this course are different from those of the internal version" (p.40, Baldwin & McInnis, 2000). They comment that results from the external survey "were much more positive than those from the internal survey" (p. 40), a finding that was attributed to the fact that external students tended to be older (30.7 yrs vs 23 yrs approx.). The evaluators concluded that: "In general, older students are more positive about the common units and indicate they understand and accept the rationale for the program". This was followed by the comment that one external student interviewed still saw the need for discussion of the 'big ideas' introduced in this unit and suggested that an email discussion group be initiated (p.41). This suggestion was implemented for all units and all modes in the following year, though participation varied widely across units.

VI DATA, PATTERNS AND TRENDS

This chapter will attempt to consolidate the insights from the existing literature and will form a transition between the theoretically-based literature and the analysis in the following chapters which is based on a more formal predictive model of academic outcomes.

This section will entail:

i) a description of data collection, data definition and data quality

ii) a brief description of the distribution of individual variables (predictors and outcomes)

iii) an exploration of the main predictors of attrition in Common Units by examining patterns and trends of participation in the program.

i) Data Collection and Data Definition and Data Quality

The data for this study were drawn from common unit enrolments gathered across databases (notably ASCOL), held by the student records and reporting section. After a number of attempts through 2002 to produce data sets of total enrolments (or enrolment events) in the common units since their inception in 1998, a good quality data set was produced for the years 1999-2001 numbering 7,535 records generated for a total of 3,737 students. Of these 7,535 enrolments, 4,986 continued with the unit, while 2549 were withdrawn before the census date.

Data quality was considered to be extremely important, since inconsistencies or ambiguities in the definition of variables (such as withdrawals) will produce unreliable conclusions, no matter how sophisticated the statistical method of analysis. Because of some of the difficulties with the 1998 data set, data for this year was dropped and the years 1999-01 were taken as the base model. Because of a change in method of coding for the 2002 data, student values for the Field of Education variable (which assigns courses to broad areas such as Education, Health Studies etc) were not included for that year in this analysis and were therefore counted as missing. This had only a minor effect on the quality of the data and on the statistical significance of the results obtained.

A Pass result was equated with the "Completed" administrative category, and "Pass" in the following analysis refers to all grades ranging from PC to HD in Table 6.1. Accordingly, the results recorded variously as Fail (F), Withdrawal Fail (WF), Not Attended (NA) and Failed Absent (FA) - were all coded as Fail. Withdrawals referred therefore only to those enrolments withdrawn before census date, where no penalty was applied. The Withdrawal without Penalty (WW) and the Incomplete (I) which referred to continuing enrolments were coded as missing (Table 6.1). To summarise, out of 7535 enrolments, 2549 were withdrawals before the census date, 260 were either WW or I and seven were non-usable and also coded as missing. This leaves

a usable total of 4719 of continuing enrolments, which were the basis of the analysis of results in the following chapter. Throughout the data processing phase, cleaning of the inconsistent or unreliable data was necessary in order to address two classes of misleading enrolment data, respectively: (a) "phantom enrolments" – those in semesters when the unit was not available, but were retained as part of the faculty for accounting purposes and (b) "orphan enrolments", which were often solitary entries in the following semester, wrongly entered because of delayed marking. The former were easily dealt with, given the researcher's and the academic coordinator's knowledge of the history of availability, while the latter (often no more than a handful in any one year), were reassigned to their appropriate or "parent" semester. There were very little missing values, the most notable exception being for the Indigenous category. In these thirty-three cases, a positive response was given the value of 1, while all the others, including the missing values, were counted as 0 (non-Indigenous). Since this decision affected only 0.4% of the total sample, it was not considered to have a significant impact on the result. The modal number of valid cases for bivariate analysis for the continuing enrolments was 4719, which represents 95% of the non-withdrawal sample.

All data were anonymously collected, the only identifier being the student number, and were processed under the strict provisions for guaranteeing both the privacy and confidentiality of individual students as specified by the University's Human Ethics policy. Though the term "sample" is used to describe the base for data-collection and analysis, this is an enumerated population for the students taking Common Units over the years 1999-2002. It is the equivalent, in a sense, to a census-method of gaining data from that population, rather than a probe or polling exercise. The enumerative sampling strategy is not rare in social science, but usually comes at the cost of eliminating the more subjective and qualitative aspects of the client experience. A more restrictive study of these aspects was to be the subject of the proposed survey and was expected to provide a complementary source of evidence but did not eventuate due to an unacceptable response rate. However, it must be stressed that it is better to have sound estimates of the behavioural characteristics of an enumerated population than biased estimates of subjective or attitudinal variables from a small and non-representative sample of respondents. There should be no sense of trade-off here, since the case for obtaining more qualitative and attitudinally-based evidence is still strong and should be pursued by alternative data collection strategies.

(ii) Sample Characteristics: Individual Variable Distributions

For the sake of economy, the socio-demographic distributions are folded into Table 8.1 in Chapter 8. From this table, it would appear that the characteristics of the majority of students enrolling in common units are female (66%), young (58% under 25 yrs), non-indigenous (95%), Australian or New Zealand citizens (93%), resident in the Northern Territory (86%), studying full-time (75%), in their first year of study (68%) and taking the unit in the internal mode (66%). Parent or home courses are predominantly in the fields of business (27%) or social and cultural (23%) fields of education, with education and health together contributing just over a quarter of the total. These modal values should not, however, disguise the diversity of the client group. One third of the enrolments are male, just under a fifth are by students over 35 yrs (one in twenty over 45 yrs), one in ten are by students to whom English is a second language, a third are taking the unit in an external mode, a third have chosen to take the unit after the first year of study and about one in seven are non-NT residents.

There is no doubt that this diversity is increasing as external and interstate enrolments increase, as overseas and indigenous students make upa larger proportion of the student body, and as previously exempted courses such as Law are included in the compulsory framework. This

imbalance between the characteristics of the well-defined "typical" student enrolment and of the diverse and under-represented minorities presents the greatest challenge for course designers, lecturers and tutors. The distributions both of withdrawal and of passes for the sample are also available in Table 7.1 of the following chapter. More detail is provided by the distribution of grade recorded as displayed in Table 6.1. The academic performance outcomes are by no means unusual and, indeed, show a somewhat normal or bell-shaped distribution above the Pass Conceded grade. The main problem here is with the Fail and Fail Absent grades which account for an abnormally high proportion of the total continuing enrolments (just under a third). When combined with the very high rate of withdrawals before census date (again a third of the original enrolments), the problem of attrition can become quite critical.

Table 6.1: Distribution of Common Unit Enrolment Outcomes (1999-2002)

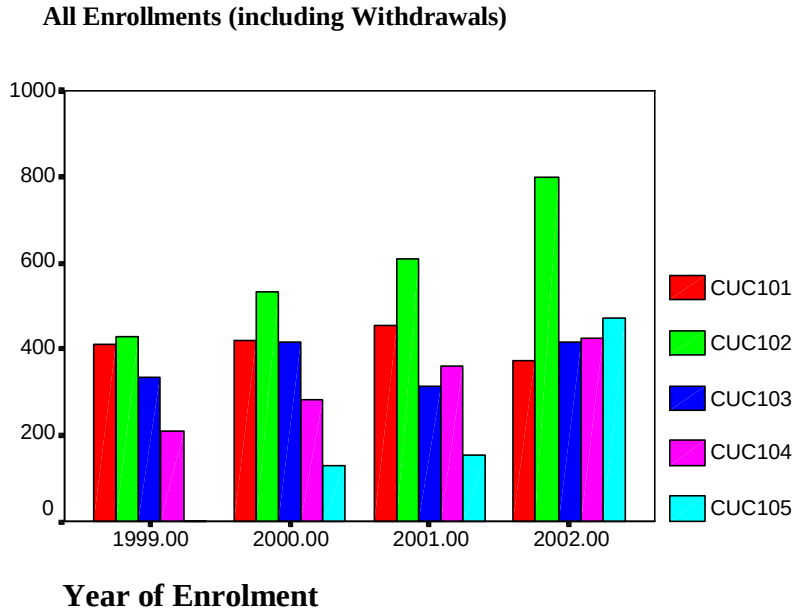
Result	**N**	**% of Results Recorded**
High Distinction (HD)	248	4.9
Distinction (D)	888	13.8
Credit (C)	1223	24.6
Pass (P)	739	14.8
Pass Terminal (PT)	2	0 .04
Pass Conceded (PC)	47	0.09
Fail (F)	628	12.6
Failed Absent (FA)	799	16.02
Withdrawn Fail (WF)	146	3
Not Attended (NA)	6	0.12
Incomplete (I)	125	2.5
Withdrawn Without Penalty (WW)	135	2.7
Total Continuing Enrolments	4719	100
Withdrawn Before Census Date	2549	
Total including WDs before Census	*7535*	

(ii) Trends, Distributions and Associations among Predictor Variables

We turn now to describe the individual variables which will need to be included in the predictive model, before proceeding to examine their interconnections which will be associated

with each enrolment event (rather than with individual students). The majority of the variables were defined by administrative category taken from the database and have already been discussed. Some, however, needed to be operationally derived. Northern Territory residency, for example, was defined by the postcode of the home address (there were 430 missing values here, which were allowed to stand). First Year of course status was derived from the year component (first two digits) of the student number.

Fig. 6.1 Trends in Common Unit Enrolments:1999-2002



Trends in Enrolments First we will examine the overall trends in the pattern of unit enrolments over the years 1999-2002. The trends outlined in Fig. 5 indicate a considerable increase in the number of enrolments in all of the common units in all semesters across the years 1999-2002. The most dramatic increase in absolute terms was for enrolments in CUC102 (Reading and Writing in the World of Ideas), though this unit had a high rate of withdrawals, often through exemptions. Units offered internally in Semester 1, CUC101 (North Australian Studies) and CUC102, showed the highest number of enrolments. Steady and consistent upward trends also typify enrolments in CUC104 (Northern Exposure) and the new unit, CUC105 (Cultural Studies). Both of these units are offered in online mode for external students and seem to have met with considerable success in that medium.

These trends in increased enrolments must be put in the context of an upward trend in enrolments at the NTU/CDU over these years, particularly for external students, whose proportion of total EFTSU rose from about 6% to just under 25% of the total student body over these years. Since only a small number of courses were exempted from compulsory enrolment in the Common Unit Program, these figures do not reflect increased demand or even greater acceptance of the program throughout the University. Because of the temporal factor on the changing pattern of uptake of common units, the year of enrolment should be considered as a possible influence (random effect) on attritional outcomes.

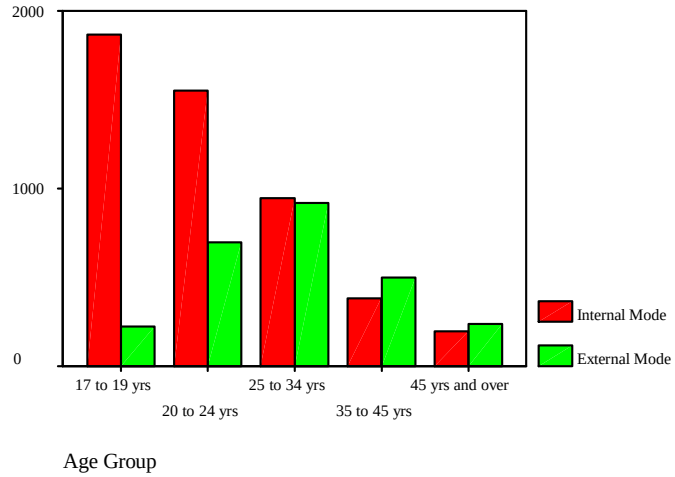
The associations among the variables age, mode of delivery and first year of study and levels of satisfaction, present a promising field for identifying the individual predictors of attrition. One obvious question is whether the positive association between external modes and satisfaction level is due t the fact that external students are older, or whether the study mode represents an independent effect on satisfaction levels, in its own right. Although further exploration of this issue fell beyond the terms of reference of the 1999 evaluation, it nevertheless suggests that there could be several ways in which age and mode of delivery (including the option of online delivery) could affect student outcomes in the Common Units. Possible lines of enquiry can be given greater depth at this point by an examination of the existing database for the NTU/CDU population of all the Common Unit enrolments between 1999-2002 in the database described above.

Some of the following exploratory observations are relevant at this stage:

1. **Age Effects**: An examination of the age gap between internal and external enrolments internal has a sound grounding from an analysis of the Common Unit database. A distributional analysis indictes a clear contrast in the age spread of internal versus external enrolments (Fig. 6.2). Here we see that, while the numbers for internal students declines systematically (negative virtually linear trend) across the age groups, for externals, the distribution is much more like that of a symmetrical, bell-shaped curve, with the mean, mode and median all converging on the 25-34 yr age group. This is potentially an important observation. Not only does it confirm the existence of an age gap between the means or averages of students in the two modes of delivery, it also opens up the possibility that the spread of their respective distributions could be a factor in shaping the pattern of student response to the program. While for internal students, "older means fewer" (and perhaps more visible), for external students there is no such linear trend, as each age group is less evenly matched with another across the distribution. This analysis has important implications both statistical and pedagogic. For the moment these results indicate that any predictive methodology should be "distribution-free" rather than one which relies on the assumption that the underlying distribution of all variables is normal.

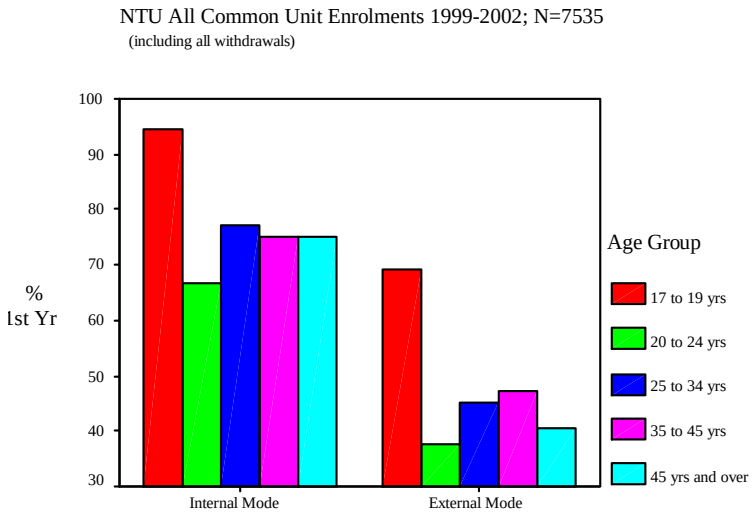
Fig. 6.2 Mode of Delivery by Age Group

NTU All Enrolments: Common Units 1999-2002 ; n=7535
(jncluding all withdrawals)



2. **First Year Effects** Because internal students are more likely to be full-time, they have tended to enroll in Common Units during their first year of study. The relationship between internal mode and year of study appears to hold true across the age range (Fig. 6.3). Internal students, in addition to being younger, are therefore more likely to confront a common unit earlier in their cycle of studies.

Fig. 6.3 Percent First Year by Age and Mode of Delivery



3. **Flexible Learning Effect** Because external students enjoy a greater exposure to a range of flexible learning technologies, including web- and email-based materials, they may be presumed to have therefore a qualitatively different experience. For reasons yet to be explored, this experience may be more highly valued. It is perhaps significant in this regard that a considerable proportion of full-time students (23.3%) opt for the external mode of delivery (Table 2. 2), a much higher proportion than might be expected.

Table 6.2 Mode of Delivery by Part-time/ Full-time Status (n=7535)*

			Mode of Delivery		
			Internal	External	Total
STATUS	Full-time	Count	4337	1317	5654
		% within	76.7%	23.3%	100.0%
	Part-time	Count	627	1254	1881
		% within	33.3%	66.7%	100.0%
Total		Count	4964	2571	7535
		% within	65.9%	34.1%	100.0%

* All Common Unit enrolments, 1999-2002 (including all withdrawals)

4. **Gender Effects** Although gender differences will be discussed in more detail in the following section, it is clear that the gender ratio in enrolments differs quite significantly across the two modes, with the female to male ratio being 3:1 (75% to 25%) in the external mode as against roughly 3:2 (61% to 39%) in the internal mode (as against 2:1 or 65.8% to 34.2% inn both modes). This gender participation gap between the two modes,

though not as pronounced as that for age, certainly deserves consideration as a possible confounding factor in explaining any difference in the satisfaction levels.

Table 6.3 Mode of Delivery by Gender (n=7535)*

			Mode of Delivery		
			Internal	External	Total
Gender	Female	Count	3031	1929	4960
		% within	61.1%	75.0%	65.8%
	Male	Count	1933	642	2575
		% within	38.9%	25.0%	34.2%
Total		Count	4964	2571	7535
		% within	100.0%	100.0%	100.0%

***** All Common Unit enrolments, 1999-2002 (including all withdrawals)

Conclusions

This review and preliminary exploration have provided the building blocks of a predictive model through which the problem of attrition levels in the Common Unit program may be systematically explored. The approach here has been predictive rather than explanatory, though the "no significant difference" debate over modes of delivery show just how entangled are issues of effects and outcomes are with substantive pedagogic and philosophical issues. The relative expansiveness of this review has been determined by the complexity of the nature of the common unit program, drawing as it does on issues of first year study, modes of instruction, the utility of foundation programs, as well as on the "usual suspects" in the prediction of academic performance such as gender, age, ethnicity and linguistic background. Socio-economic background and related indicators (such as housing) were not considered relevant in this context, due to their relative unimportance in the planning and delivery of these units, though they have great significant in the wider context of equity policy. The selected factors were then given some local context in the review of the student surveys and related evaluations on student satisfaction with Common Units. Finally the distribution of the relationships among the more prominent of these effects (age, gender, mode of study) were explored in the official Common Unit database.

It remains to draw together the main conclusions of the investigation, before proceeding to the next stage:

a) Common Units, as a compulsory, interdisciplinary and introductory program, has similarities with those of several other tertiary institutions in Australia confronted with an increasingly diverse and vocationally oriented student population.
b) The Common Unit program has combined both the liberal/general education ideal and skills and literacies orientation. These twin objectives have to some extent been clarified by the reduction in the number of electives and the introduction of a compulsory unit in Academic Literacies.
c) Explanation of student outcomes must take into account levels of student satisfaction with teaching and course quality, attitudes toward, and perceptions of, the student experience as well as rates of performance and retention.

d) Academic performance and participation in recent studies of University and School populations appears to be positively influenced by gender (female), Indigenous status (non-Indigenous), ethnic and linguistic family background (non-Australian born or non-English speaking) and location (metropolitan). The findings on gender and ethnicity/ linguistic background reflect recent trends and contradict the findings of earlier studies of educational disadvantage.
e) First year of study factors combine with institutional location to affect the levels of student engagement with university life and satisfaction with teaching quality. Positive predictors of first year outcomes include age (being over 25 yrs), gender (female), birthplace (Australian-born), having paid work and field of study.
f) Mode of delivery (internal / external) appears to have indeterminate influence on student satisfaction and academic performance, since its effects are confounded with technological, pedagogical and methodological issues. However, the external mode of delivery appears to predict higher levels of student satisfaction in a similar Australian program.
g) Two student evaluation surveys (internal and external) were carried out in the early years of the Common Unit program. They both indicate overall neutral to low-positive levels of student satisfaction. In the internal survey, age (positive) and non-English speaking background (negative) were the only significant predictors, controlling for mode of study, gender, overseas, non-Darwin location and Indigenous status.
h) The external survey results showed no statistically significant effects on a number of key items in relation to field of study, age, language background, Indigenous status. However, here age (25 or over) was a strong and statistically significant predictor of five other items indicating student interest and enjoyment of the unit.

It remains, then, to build on the insights gained from this review to specify a generic model which may then be tested against the data available on the other main outcomes, rates of withdrawal and academic performance in the Common Unit program.

VII FORMULATING A PREDICTIVE MODEL

The first step towards answering the questions, as set out in the terms of Reference (Chapter I), is to identify a set of factors of student attrition (withdrawal and failure) which might be included in a predictive model. This exercise will obviously be limited operationally by the information available in the data bases held at NTU/CDU, but it does at least set the parameters of the task. The second will be to specify this model in such a way that the individual contribution of each factor to one of the outcomes (failure, withdrawal) may be meaningfully assessed (ideally in terms of levels of percentage probabilities or levels of risk). A third, and related, task is to identify particular segmentations (or groupings) of the student population in terms defined by the combinations of values within the various factors which generate different levels of risk in unique and often quirky ways.

While the first exercise is to some extent given by literature review above, the second will rely on a specification of a (binomial logistic) predictive model which uses statistical methods to estimate the probabilities or levels of risk of failure (or success) in a particular unit. An example of this method might be the prediction of success in the North Australian Studies unit (CUC101) of a male student who has been studying externally, aged 35-44, comes from an English speaking background, is enrolled in a health sciences course and in his third year of study. The statistical output might put this student's probability of passing at, say, 58%. We could then estimate the independent effect of a change in the value of any one of the predictor variables on a student's result. The prediction that a female student who shares the same values on all characteristics, might be estimated at a much higher chance of success, say 70%. Such a finding has some obvious implications for the way a unit might be designed and delivered, and possibly for the development of the unit offerings across the program as whole.

The third of these tasks demands a more fine-grained analysis which probes the effect of unique combinations of values of these predictor variables on student outcomes. Although we might find, for example, that "being female" generally improves the chances of success, it might not behave in this way for certain categories of students. It may have no effect, say, for overseas students studying in the internal mode, or to indigenous students who are taking a particular unit by online delivery. This more detailed and exhaustive strategy is sometimes called "data-mining" and is often used by market researchers to identify or target segments (niches) of a population. A data-mining technique could be usefully applied, therefore, to define patterns of success and failure that are often concealed among the general trends, for example by two-variable percentage tables and bar charts.

Specifying the Model: Attributes, Access, Availability, and Achievement

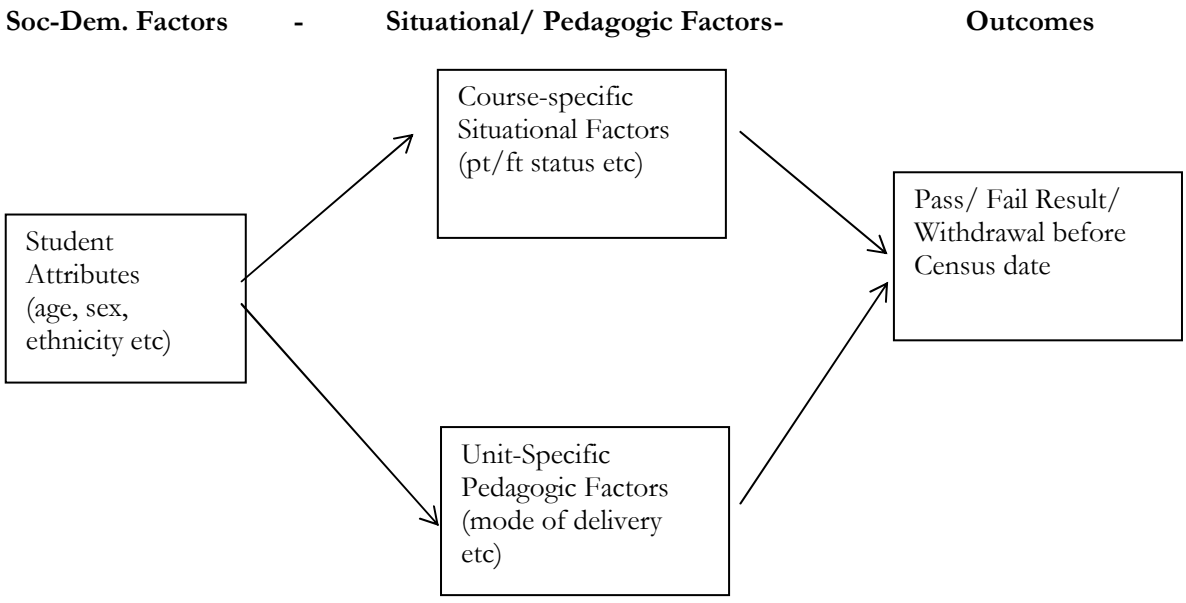
The review of the literature revealed the generic factors that affect student success in schools and universities such gender and age, socio-economic status, ethnicity and linguistic background, geographical location and indigeneity. These have been supplemented by a review of those factors relevant to distance-learning and part-time status, as well as by the evidence relating to inter-disciplinary and foundation units.

How do these individual factors shape a student's experience and chances of success within the NTU/CDU's common unit program in the period selected (1999-2002)? In modelling this process, we must first specify the relevant factors created by the NTU/CDU environment and by the program itself. In formal terms, some of these factors are structural i.e. determined by the availability of units, modes of study and program factors – while others are situational ie. defined by the choices that students make within a structure, such as the semester or mode in which the unit is accessed.

In practical terms, it is often difficult to distinguish between these two levels. It might be more meaningful, therefore, to divide non-personal factors into their substantive rather than their formal classes: namely (a) those which are course specific – which relate to the student's overall position in the program such as full-time/ part-time status, year of study in the parent course, field of education of that course (e.g. education, health sciences) and (b) and those which are unit specific – such as the unit in which the student is enrolled, year and semester of enrolment and the mode of delivery of that unit. These two classes of factor must then be added to the student attributes mentioned above and collectively assessed to predict the outcome of interest, depending on the data available.

For fully enrolled students the result can be represented, for example, as either a simple pass/ fail (Completed / Not Completed). In the case of the large group of students who have withdrawn before the census date, a dichotomous variable – Withdrew/ Continued - could be created. These four sets of variables therefore fall into "blocks" which can be visualised in the form of a predictive model of success as illustrated in Fig 7.1.

Fig. 7.1: Predicting Outcomes in the Common Unit Program: a Generic Model



The testing of this type of predictive model, common in the social and behavioural sciences, has been developed in the form of a statistical procedure known as the "general linear model" (or GLM). In the univariate case (one outcome) the researcher first of all assigns the predictor factors (i.e. all those in the boxes to the left of the "result recorded" box) into one of four classes:

1) There are the "fixed" effects, which are usually of central interest since these can be manipulated by the experimenter. These might be the level of a drug, or the temperature of a room, or the exposure to a course of treatment.

2) There are also the random factors, which might be simply the group to which a subject has been assigned, or some uncontrolled factor such as the day of week of the experiment.

3) The covariates, such as the age of the subject, or their previous exposure to the experimental condition. These non-random effects must be "controlled for" or "held constant", usually at their mean value, so that the independent effects of the fixed and random factors might be accurately estimated.

4) Finally, those effects which do not represent real variables, but are rather formed from combinations of variables already in the model. These are the interaction terms, those unique or "quirky" effects that occur when different values between two or more of the predictors combine to produce an unexpected influence on the predicted or dependent outcome. Interaction effects can be very powerful in the social sciences, and are often the basis of programs targeted at particular or exceptional groups, eg to justify sex-segregation for high ability students.

The classes of factors identified in Fig. 7.1 can now be defined more precisely in light of the general linear model. The "fixed" effects might be defined as those which can be set by the University such as the mode of delivery of a unit, the content orientation of a unit (i.e. towards science or humanities/social sciences), and, within the external mode, the option to deliver the unit mainly by print-based or online-based media. Random factors can be identified as the semester in which the unit is taken.

Covariates might be identified as the linguistic background of the student, the year of the student's course cycle in which the unit was taken (supposing a maturation effect that might give students an advantage), or a student's ethnicity or gender. Interaction terms might emerge from combinations among these three classes. Gender may interact with age or mode of delivery to produce a larger "gender gap" (eg a higher success rate for older female than for younger female students relative to their male peers). Linguistic background may interact with content-orientation in some cases, as when a non-English-based assessment method provides ESL students a distinct advantage over those whose primary language is English. A full ("saturated") general linear model would test for the significance of each of these types of factors and effects against a null hypothesis (i.e. of no effect).

While this procedure is ideally suited to classical experimental research designs, a less constrained approach to "effect–classification" has been shown to be more to achieve the same analytical results. This is particularly true in the field of epidemiological research with which the present investigation has great similarities in research design and methodology. While it is analytically useful to maintain these distinct classes, in operational terms, it is sometimes advisable to abandon them in a more exploratory design, one where variables are not controlled by the experimenter and where the variables are measured in a naturalistic setting.

There appear to be four main reasons for adopting a regression procedure rather than the classical research analysis variance design for this kind of investigation.

1) A less experimentally based model, which initially classes *all* the independent or predictor variables as covariates provides very similar estimates to those of the general linear model's analysis of variance procedure.

2) Although random variables, such as year or semester of study may be perhaps more appropriately treated through multi-level procedures, for the present purposes they may be broken up into a number of "dummy variables" (e.g. three terms would yield two contrasting variables) and also included among the covariates.

3) Significant interaction effects can be more easily picked up less laboriously through a data-mining technique such as an automatic interaction detector which generates meaningful population (or market) segmentations. This technique, not available in the experimental design, has the advantage of ranking groups of individuals by their characteristics on the basis of their probability of outcome (eg success or failure), a useful tool for targeting treatment options to specific client segments.

4) A comprehensive regression model has the added advantage of being more adaptable to the more recently developed logistic techniques which are uniquely suited to the prediction of the binary outcomes (e.g. pass/fail, continue/withdraw) which characterise this study.

Logistic regression models produce precise weights for the independent effect of each predictor by a model which can be readily translated into estimates of risk (eg of passing or failing a unit).

These estimates have been shown to provide more transparent evidence for decision-making than the F-ratios of analysis of variance modelling. For all these reasons, a logistic regression method will be adopted here. The results of this analysis will display comparable and readily understood estimates of risk (percentage probability of success or failure) for particular classes of students in varying situations of unit delivery and course affiliation. It remains, then, to describe the operational procedures which generated the data against which this type of model can be tested.

VIII PATHWAYS TO SUCCESS: TESTING THE MODEL

The generic model in Fig 1 was tested against a data set which included all enrolments over a number of years (in this case, four, 1999-2002). The primary unit of analysis was taken in the first instance to be the enrolment record in a specific unit, rather than the individual student's performance history in the program. This strategy has the advantage of decoupling student overall performance from unit performance and is administratively the more attractive option, since that is the way that data were recorded and reported by the University. However, this approach has certain limitations and could at a later date be usefully supplemented by a student-level strategy which takes into account individual histories such the number of units in which a student has enrolled, a student's average performance in the program, and the ratio of withdrawals to completions in the enrolment record. These student-level issues represent not only important considerations for unit development and planning but also raise statistical issues such as possible distortions in the sample arising from the over-representation of students with higher numbers of enrolments. However, for the present analysis, since each enrolment event is unique, it was decided to treat this as the primary unit of data and to leave the student-level analysis to more sophisticated methods such as multi-level and variance component modelling at a later date.

The following methods were employed:

(1) An analysis of bivariate and multivariate (i.e. controlling for other relevant variables) relationships between predictors and outcomes. For the multivariate analysis, logistic regression techniques, described in the preceding chapter, were used for estimating risk factors for success or failure, completion/withdrawal).

(2) A data-mining method for grading groups of enrolments according to their relative risk of passing or failing . This produced a segmentation analysis based in the unique interaction effects that often elude the more linear methods of (1) and is a widely-used technique in market research.

Identifying Key Predictors

Bivariate Associations The pattern of withdrawal appears to be fairly randomly distributed among the various categories of predictors. Generally, they cluster around the mean percentage of about a third of the total enrolments and do not reveal any significant percentage differences. The exceptions here are the significantly lower withdrawal rates for part-time students who are in advanced years of study and taking the unit in an external mode. Health sciences students also have a significantly lower rate of withdrawals. The cluster of variables predicting withdrawals suggests that a lower rate may be a function of two influences in that (a) external students are locked into a particular set of options which they find more difficult to change administratively and (b) external students are cut off from consumer environment in which word-of-mouth information may make a switch seem an attractive option. This latter factor is increased by the opportunity available to internal students to "shop around" at the beginning of semester by

auditing lectures (and sometimes tutorials) in the range of units on offer. These both seem to be structural advantages of the internal student which are difficult to avoid without imposing draconian constraints on unit switching by agreements among the various unit coordinators. These would not be acceptable in a market-driven environment, particularly when internal students have always the option of taking a unit offered in external mode in any one semester.

The pattern of success or passing a unit, in contrast to the structural and fairly random patterns of withdrawals, the patterns of success/ failure, would appear to be quite systematic. Not only are they much more clearly grounded in the categories of the predictor variables, but also these variables are predominantly socio-demographic rather than situational. Foremost perhaps is the huge gap between indigenous and non-indigenous enrolments. At a percentage difference of almost 30%, this represents the largest effect on performance in common units among the various predictors. Not nearly so great, but still quite significant, are (a) the gender gap of almost 10% in success rates which favours female over male, and (b) the mode of delivery gap of 6.5%, favouring internal over external enrolments. Age is also a powerful influence, though its effect is mixed. While younger students (17-19 yr olds) perform at about the average rate, the next youngest category, 20-24 yr olds, appear to do worst of all. Older students tend to do quite well, with the oldest category (45 yrs and over) performing better than any other category among the entire range of predictor categories, at a pass rate of 76.4%.

Enrolments from professionally oriented courses (Education, Health Sciences) tend to have a much higher rate of success (lower rate of failure) than those in either business or social and cultural fields of study. Just as notable as the predictors of success or failure are the other patterns. It is interesting that English as a second language has only a slightly depressing effect on success rate (-2.2%, not significant) and that non-Australian citizenship is associated with a much higher than average success rate (73% vs 67%, significant, p=. 013) for this small minority of enrolments (6.8% of the total). Northern Territory residency has no significant effect, nor does being in a non-first year of course enrolment. Counter-intuitively, indeed, first year students appear to have a slight, though not significant, advantage. Full-time status confers no advantage, either. All in all, the significant and non-significant predictors present a complex and interesting pattern which requires further analysis.

Table 8.1: Enrolment Outcomes by Various Predictors: Common Units, 1999-2002[#]

(back)

Predictor Variable	Total Number	% Withdrew before Census Date	Number Continuing	% Continuing who Passed Unit	Number Passed
Gender Male	2575 (34%)	33.6	1599	60.4	966
Female	4960 (65.8%)	34.2	3120	69.9	2181
Age 17-19 yrs	2088 (27.7%)	32.7	1348	69.2	933
20-24 yrs	2260 (30.0%)	32.9	1434	58.4	837
25-34 yrs	1867 (24.8%)	36.2	1116	67.9	758
35-44 yrs	884 (11.7%)	34.6	265	73.2	194
45 yrs and over	434 (5.8%)	33.5	556	76.4	425
Indig. Indigenous	407 (5.4%)	34.4	244	48.4	118
Non-Indigenous	7128 (94.6%)	33.8	4475	67.7	3029
Citizenship Overseas	511 (6.8%)	33.7	316	73.1	231
Aust/ NZ	7024 (93.2%)	35.2	4403	66.2	2916
Language ESL	806 (10.7%)	36.2	490	64.7	317
Non-ESL	6729 (89.3%)	33.5	4229	66.9	2830
Home P/Code NT res	6085 (85.6%)	29.9	4033	66.8	2694
Non-NT res	1020 (14.4%)	30.2	677	66.3	449
Status Part-time	1881 (25.0%)	23.6	1346	67.0	902
Full-time	5654 (75.0%)	37.2	3373	66.6	2245
Yr of Course 1st Year	5142 (68.2%)	36.2	3107	67.5	2098
Non-1st Yr	2393 (31.8%)	28.7	1612	65.1	1049
Mode External	2571 (34.1%)	29.6	1670	62.5	1043
Internal	4964 (65.9%)	36.0	3049	69.0	2104
FOE* Education	849 (16.8%)	35.8	522	71.3	372

Health Sciences	578 (11.4%)	27.3	396	71.0	281
Social & Cultural	1140 (22.6%)	33.2	728	62.2	453
Business	1338 (26.5%)	35.4	833	64.7	539
Natural& Physical Sci.	411 (8.1%)	34.8	256	69.1	177
			Missing = 267		
Totals (1999-2002)	**7535 (100%)**	**33.8 (n=2549)**	**4719 (Valid)**	**67.7**	**3147**

*Field of Education (FOE) figures based on 1999-2001 data only (n = 5054)
[#] Statistically significant differences (Fishers Exact Test, p<. 05, two-sided) in bold type

From Associations to Risk Factors

Any attempt to explore the patterns of association between predictors and outcomes identified in Table 4 must confront the interplay of various predictors. Is the gender gap, for example, partly due to a prior association with age or mode of delivery? Is this gender effect implicated in the superior performance of students from particular fields of study? Could age be somehow associated with the higher failure rate of indigenous students? Does the mode of delivery effect mask its association with other variables? These questions can only be answered by a multivariate analysis, whereby the effect of each predictor may be independently estimated. Since this is a non-experimental study, the appropriate technique will be logistic regression analysis, as argued above. This technique is ideally suited to this kind of study, where the outcomes are easily dichotomised (withdrew/ continued, passed/ failed) and where the probabilities associated each outcome for each predictor may be estimated, while all the others are held constant at their mean or average value.

There will be three stages in this section

(i) A multivariate analysis by logistic regression will be carried out on the data for years 1999-2001, for which a full data set is available, in order to the assess the independent effect of the factors identified in Table 4.

(ii) The results of this logistic regression will be translated into probabilities (or estimates of risk) of passing / failing a common unit for typical enrolment profiles.

(iii) A more detailed analysis in the following chapter will explore some of the interactions or unique combinations of values of the most powerful risk factors.

Behind the Associations: A Multivariate Analysis of Attrition Outcomes

The results of a multivariate analyses of predicting the odds of either passing, or withdrawal from, a common unit in Tables 5 and 6, based on variables were shown to have some initial association with the pass outcome. Here the year of enrolment was also included as a predictor variable, in light of the changing environment of student uptake over this period. Age was reduced to a simple dichotomy of under and over 25yrs at time of enrolment. This exploratory analysis gives some indication as to whether there may be a stronger basis for isolating the effect

of each predictor than that indicated by the simple bivariate association of Table 8.1. The logistic regression equation is designed to predict the logarithmic value of the odds of a particular outcome, that is the probability of its occurring divided by its probability of its not occurring or *p/(1-p)*. Odds are therefore not the same as the estimate of probabilities or risk which is closer to the commonsense terminology of chance. However, the logistic regression method provides a very valuable basis for estimating the power of each effect and its results can easily be converted back to probabilities or risk estimates, as we shall see in the following section.

The predictive values of each variable are shown in Tables 8.2 and 8.3. Across these columns, these values are respectively, the coefficient (B), the logarithmic value of the odds ratio of the variable in the total equation. Its standard error (S.E.), a function of the size of the sample is used to calculate the next column values. This is the Wald statistic, which is the square of the value of B divided by the value of the standard error for each term. This value in turn is used to calculate the significance ("Sig.") of the effect of that predictor, using a chi-square distribution whose degrees of freedom ("df") are shown in the following column. The column on the far right, which gives the relative odds for each effect, is perhaps the most meaningful of all. As a rule of thumb, values higher than 1 indicate a raised likelihood of the outcome (eg passing a unit), while values less than 1 indicate a lowered likelihood. The constant is a baseline or initial term, independent of the main predictors. It can be ignored when making comparisons among the values of the relative odds of the predictors of interest.

Table 8.2: Results of Logistic Regression Predicting Pass or Higher in Common Units (1999-2001)

	B	S.E.	Wald	df	Sig.	Exp(B)
CALENDAR YEAR	-.239	.049	23.268	1	.000	.788
EXTERNAL	-.682	.093	53.781	1	.000	.506
INDIGEN	-1.040	.155	44.767	1	.000	.353
MALE	-.452	.085	28.452	1	.000	.636
OVERSEAS	.270	.166	2.631	1	.105	1.309
CRSEDUC	.147	.117	1.577	1	.209	1.159
CRSHLTH	.338	.135	6.300	1	.01	1.403
CRSSOC	-.227	.099	5.288	1	.021	.797
UNDER25	-.536	.089	36.338	1	.000	.585
Constant	478.770	98.959	23.407	1	.000	8.46

From Table 8.2, it is clear that most of bivariate associations identified in Table 8.1 retain statistical significance as independent predictors of student performance in common units. Two effects stand out as exceptions, however. Non-Australian or NZ Citizenship (Overseas) and Education / Teaching field background cease to be statistically significant, perhaps because of their prior associations with other predictors or with the New Year of enrolment variable. To test this, another regression was run which dropped the Year variable. This restored Overseas to statistical significance, though not for Education / Teaching field. The significance of all the other variables in the Table 5 equation, however, is quite high. In rank order of negative influence on passing a unit, these are: Indigenous, External mode, Under 25 yrs (but see below for interaction effect), Male Gender, Year of Study, and Social and Cultural Field of Study.

On the positive side, where a predictor has a value of Exp (B) greater than 1, there are only two instances, neither of which reaches statistical significance, as we have seen. However, it might be useful to note that overseas citizenship is not by itself a disadvantage in this model. This is an effect which may need to be broken down into country of origin at a later date, since it may seem counter-intuitive as it stands. It must be noted, however, that this predictive equation as a whole, though reaching significance, is not a powerful predictor of overall performance. Depending on which estimate of R square is used[4], it explains only between 5.5 % – 7.5% of the total variance in the distribution of pass/ fail results.

Table 8.3 Results of Logistic Regression Predicting Decision to Withdraw before Census*

		B	S.E.	Wald	df	Sig.	Exp(B)
Predictor	EXTERNL	-.327	.090	13.307	1	.000	.721
	INDIGN	-.528	.160	10.927	1	.001	.590
	ESL	-.033	.121	.076	1	.783	.967
	P/TIME	-.225	.089	6.420	1	.011	.798
	MALE	-.018	.070	.066	1	.797	.982
	O'SEAS	.054	.159	.115	1	.735	1.055
	NTRE	-.124	.114	1.186	1	.276	.884
	17-24YRS	-.264	.074	12.694	1	.000	.768
	1ST YR	.106	.079	1.817	1	.178	1.112
	CRSSC	-.115	.128	.817	1	.366	.891
	CRSHLT	-.377	.126	8.923	1	.003	.686
	CRSSO	-.296	.093	10.212	1	.001	.744
	CRSBU	-.023	.086	.069	1	.793	.978
	Constant	-.411	.159	6.684	1	.010	.663

*All Enrolments 1999-2002,

[4] For Pass Result Cox and Snell R-sq = .054; Nagelkerke R-sq= .075; for Withdrawals, .013 and .017 resp.

A similar method of analysis including ESL, NT residency and Part-Time status but dropping calendar year of study) was used for predicting the decision to withdraw before the census date. Unexpectedly perhaps, the results (Table 8.3) show a reversal of the pattern of attritional effect. Here we see that the predictors of failure now either drop to insignificance (Male, Social and Cultural Field) or else indicate (by their negative coefficients) that they are exerting a positive influence on the decision to remain enrolled. Of particular interest are the predictor variables – Indigenous, External mode and being Under 25 which have reversed their attritional effect most strongly. Part-time status by its significant negative coefficient also seems to exert a positive effect on continuing. Some of the predictors are consistent, however. The Health field enrolments have lower rates of withdrawals while the later years of study appear to have higher rates. This is, overall, a rather mixed bag. However, it does show up at least some of the complexity of the problem of explaining attrition and the necessity of an outcome-specific analysis for each phase or stage of the enrolment-result cycle.

Non-Withdrawal and the "Fail Absent" Result – Is there a Linkage?

The generally reversed pattern of prediction of withdrawals as against failure suggests that there may be an underlying pattern of association behind the two types of outcomes. Is it possible that the higher rates of failure among the external students, for example, is an effect of their greater tendency to 'stay on the books' rather than to withdraw or to enrol in another unit? Could the same be said about some of the other predictors which have switched their valence from positive to negative in the substantive sense? Are the two outcomes somehow part of the same process, the one feeding off the other, not as result of the lack of ability on the part of the student, but almost by default, as a result of passivity or perhaps lack of exposure to a student culture which has become increasingly calculative and risk-averse?

These speculative comments can be put to the test to a degree, by analysing the pattern of failure in more detail. There are basically two routes by which students are assigned Fail grades, an F, which indicates inadequate performance, and a Failed Absent (FA), which indicates that the student has failed to submit the required assessment work. These are sometimes "fuzzy sets" in that they may overlap due to inconsistencies in grading or in variations in student performance (satisfactory achievement but did not attend a final examination). However, they may be applied for exploratory purposes to test a proposition that enrolments which have characteristics that predict failure will be over-represented in the Failed Absent (and related grades such as WF) and under-represented in the straight Fail grades.

To explore this question, another prediction equation was run on the type of fail grade awarded, in which the failure grades of Table 4 were recoded into two categories, F and FA or WF, coded 1 and 0 respectively. This new variable was then regressed onto those predictors which have shown reversal in predicting their attritional outcomes, not continuing enrolment but also higher rates of failure.

Table 8.4 Results of Logistic Regression Predicting Class of Fail Grade*: Common Units (1999-2001)

		B	S.E.	Wald	df	Sig.	Exp(B)
Predictor Variable	EXTERNAL	.015	.142	.011	1	.917	1.015
	INDIGEN	-.641	.239	7.213	1	.007	.527
	MALE	.118	.133	.782	1	.377	1.125
	UNDER25	-.075	.146	.264	1	.607	.928
	CRSSOC	.048	.150	.103	1	.749	1.049
	Constant	-.538	.173	9.715	1	.002	.584

* Fail grade = 1 Failed Absent or Withdrawn Fail = 0

The results are shown in Table 8.4, which indicates that the hypothesis only holds true for Indigenous enrolments, which show a very high rate of failure through either Failed Absent or Withdrawn Fail grade (75%) compared with non-Indigenous enrolments (62%). For the other predictors, there was no significant effect, a result which was confirmed by individual bivariate cross tabulations in which the FA and the WF grades were dis-aggregatged. Though the Indigenous enrolment numbers are unfortunately fairly low, the effect is still so strong as to suggest the need for intervention. In sum, with the exception of Indigenous enrolments, and within the limitations and ambiguities of the grading scheme at this end of the scale, it must be concluded that the FA and WF grades cannot be directly connected, by way of differential withdrawal rates, to student socioeconomic or situational characteristics.

Table 8.5 Class of Failure Grade by Indigenous Identity (1999-2001)

			Indigenous		
			Non-Indigenous	Indigenous	Total
Class of Fail Grade	FA of [illegible]	Count	607	81	688
		% within [illegible]	62.8%	75.7%	64.1%
	Fail (F)	Count	359	26	385
		% within [illegible]	37.2%	24.3%	35.9%
Total		Count	966	107	1073
		% within [illegible]	100.0%	100.0%	100.0%

(ii) From Prediction to Risk: Who Shall Survive?

While the results of the logistic regression analysis are instructive in determining the relative strength of each predictor, they do not tell us very much about the risk of failing a unit in language that is immediately understood. "Log odds" and "odds ratios" are not part of the common parlance of academic decision-making and are, in fact, difficult to interpret, except in statistical terms. In order to arrive at a more accessible interpretation of these results we need to turn to the language of probability, in which the chances of an event happening can be given an exact percentage value in terms of any particular equation or model. This is normally understood in terms as a risk of a negative outcome, eg of acquiring a disease when exposed to a certain

environmental or lifestyle condition, and often expressed as a rate per 1000, though a percentage probability might be more useful in the present application.

The following analysis will therefore attempt to estimate the probability of an outcome, given predictors which have been shown to be significant. In this analysis, for the sake of demonstration, only the most important socio-demographic (gender, Indigenous, under 25 yrs, overseas citizenship) and situational (mode of study, year of enrolment) will be used. By excluding the field of education predictors it will be possible to include the 2002 data. This analysis will concentrate only on the pass/ fail result as an independent issue. Since it would appear from the foregoing analysis that differential withdrawal rates do not, with the exception of Indigenous enrolments, affect the pattern of failure, this would seem a reasonable strategy, particularly for illustrative purposes. The results of this analysis are shown in Table 9.

Table 8.6 Results of Reduced* Logistic Regression Model Predicting Pass Result: Common Units (1999-2002)

		B	S.E.	Wald	df	Sig.	Exp(B)
Predictor Variable	YEAR	-.064	.029	4.835	1	.028	.938
	EXTERNAL	-.562	.072	61.467	1	.000	.570
	INDIGEN	-.923	.136	46.045	1	.000	.397
	MALE	-.503	.066	57.406	1	.000	.605
	OVERSEAS	.279	.133	4.371	1	.037	1.322
	UNDER25	-.578	.070	67.558	1	.000	.561
	Constant	128.741	57.886	4.946	1	.026	8.160

***Omits Field of Education Predictors, but includes 2002 data**

The results of this analysis (Table 9) which drops the field of education variable and includes 2002 data, indicate that all of the predictors reach statistical significance, Indigenous identity remains the largest source of disadvantage, while overseas citizenship is the only predictor to have a positive effect on the pass result, while all the others, including later year of enrolment, are negative (i.e. with Exp (B) less than 1). We might therefore ask, for the sake of argument, what is the probability of attaining a Pass result or higher for two kinds of students, who statistically speaking, represent extremes on the indicators of disadvantage (omitting Overseas citizenship). By converting the log odds of the predicted result to a probability value[5] (Hamberg et al., 1996; Freeman, 1997) it is possible to calculate the probability of passing/ failing for an enrolment marked by any set of values over the range of predictors.

For the sake of illustration, the boxed insert ("Who Shall Survive?") contrasts the probability of failing a common unit based on opposing values for predictors of gender, age, Indigenous identity and mode of delivery for two hypothetical enrolments, controlling for year of study and overseas citizenship. The results of this analysis illustrate the cumulative effects of disadvantage on an enrolment being assigned a pass grade. Though this is a statistical exercise it is not implied that any one student should possess all of the predicted characteristics, the contrast in the risk of

[5] The probability values for the two students were found by following the procedure set out by Freeman (1997) at www.jr2.ox.ac.uk/bandolier/band37/b37-5.html, based on a medical example. This procedure was used in a similar application to the present research by Considine and Zappala (2002) to calculate the effects of socio-economic factors on the performance of Australian school students.

failure is quite dramatic. In this equation, the effect of having advantageous values on all four predictors (i.e. being female, 25 yrs+, non-indigenous and internal mode) multiplies the probability of failure by a factor of roughly two and a half to one. This ratio of relative risk must clearly be a source of concern, since it shows up more powerfully than any other analytical procedure, the dimensions of the problem when cumulative factors are taken into account.

Who Shall Survive? Estimating Risk of Fail Result from Selected Student Characteristics

Comparison of Two Hypothetical Students (A and B)

Question: What are the relative probabilities of the following enrolment characteristics predicting a Failure grade for a Common Unit from a student who is :

- Female
- 25yrs or above
- Non-Indigenous
- Studying Internally

(Student A)

compared with an enrolment from a student who is :

- Male
- Under 25 yrs
- Indigenous
- Studying Externally

(Student B)

Results of Analysis[#]:

Student A Risk of Fail Grade = 33.3%
Student B Risk of Fail Grade = 86.6%

Answer: *Student B's Relative Risk of Failure is roughly 2.6 to 1 (86.6% / 33.3%).*

[#] Based on Table 9. Estimates of risk are not absolute and indicate relative risk only

This chapter has moved swiftly from simple bivariate associations based on percentage differences in withdrawal and pass rates through to multivariate estimate of risk. The added sophistication of technique does not alter the basic patterns of prediction, though it adds more depth, detail and certainty to the underlying picture. Here we see that the major outcome, passing the unit, or alternatively the risk of failure, is strongly influenced by socio-demographic and situational factors. Though this may be the common experience throughout the higher education sector, in such a comprehensive and compulsory program as Common Units, they assume a different dimension since they are dispersed so randomly through the client population, more difficult to capture, isolate and address. For these reasons, the following chapter provides some solution, as it is based on techniques from market research which is confronted with a similar difficulty. How might a diverse population, in all its complexity be realistically described in terms of concrete groupings which reflect the probabilities of a single outcome?

IX THE ANATOMY OF SUCCESS: A SEGMENTATION ANALYSIS

The models used to predict pass/fail outcomes are by no means exhaustive of all the possibilities of prediction. As we have seen, the equation of Table 9 predicts significantly underestimates the probability of passing of a relatively advantaged student at only 67%, which is about the observed rate for the whole sample. If this is true, there must be a significant "slippage" somewhere in the prediction equation (sometimes calls "under-specification"). This slippage may be not only the result of omitting predictors (grade point average would of course raise the amount of variance explained), but also of not allowing the values of the predictors that are already there to associate more freely. Since the estimates in the equations in the previous regressions assume an additive and linear effect on the student outcome, it might be a valuable exercise to test this assumption with more fine-grained methods.

By looking more deeply into the effect of various combinations of the values of these predictors, we may discover some hidden differences which are disguised by the additive model. Just as the multivariate approach looked into the independent effect of each predictor on an outcome, so an interaction analysis goes one stage further by inspecting the effect that each value of the predictor may within the total configuration of its possible combinations with those of other variables. Depending on the number of predictors and the number of values that each may take, this type of analysis can explode the number of terms in an equation. Just four predictors however, taking only two values can, however, result in a myriad of second, third and fourth order interaction effects whose precise combination of values is often far from transparent.

This type of analysis can be approached in a number of ways. First, because interaction effects are usually small, they can be left until after the main effects have been determined. Second, these effects can often be discovered by an exploratory analysis by inspecting the distributions of the dependent variable across a range of values of a predictor. Third, there are a range of statistical programs now available which make available data-mining methods which automatically detect and isolate those effects which are significant. While these data mining methods are essentially heuristic rather than explanatory, they have the advantage of producing meaningful segments of a population which can be targeted for specific forms of treatment of intervention and have been found to be particularly useful in market research. This section will be devoted to the second of these considerations, namely the exploration of some of the more obvious forms of interaction in predicting the pass result, across the value combinations of only one or two predictors. In the following section, the whole sample will be analysed with an automatic interaction detection program (CHAID) in order to model these effects in more depth.

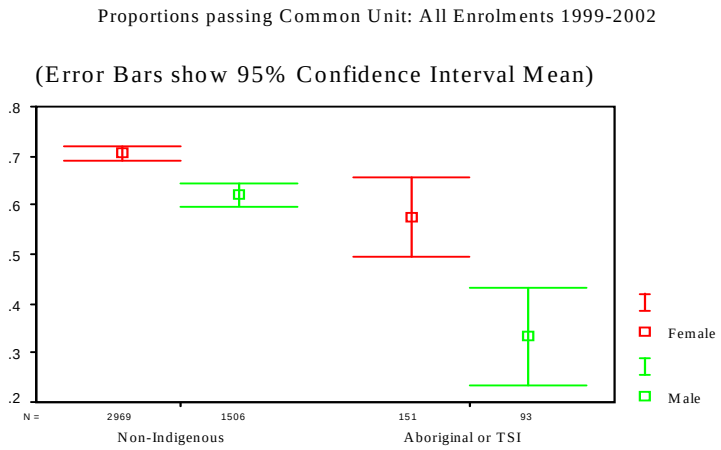
Exploring Interactions

The models used to predict pass/fail outcomes are by no means exhaustive of all the possibilities of prediction.

This chapter will be therefore be devoted to the the exploration of some of the more obvious forms of interaction in predicting the pass result, first by looking at the combinations of values for only one or two predictors and then, in the following section, these interaction effects for

several predictors will be exhaustively analysed with a data-mining application (Chi-squared Automatic Interaction Detection or CHAID).

Fig. 9.1 Gender by Indigenous Status Interaction

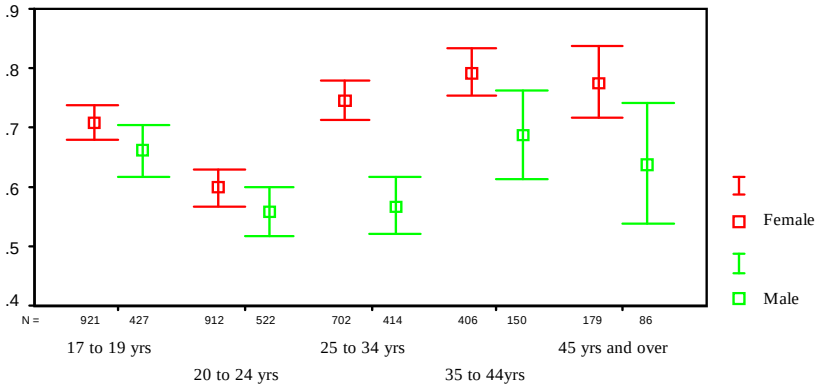


The results of the first exploratory interaction analysis, of Indigeneity and gender in predicting pass rates, are displayed in Fig 9.1. This shows an error bar chart of the mean proportions for each of the four possible groups generated by the 2 x 2 categories. The discrepancies in the means for each cluster demonstrate just how misleading it might be to assume that all Indigenous students are equally under-achieving in comparison with non-Indigenous. While the confidence limits (i.e. the width of the bars) are larger because of the much smaller Indigenous sample, there is no doubt that male Indigenous enrolments are significantly lower than each of the other three groups, with only about 35% passing. Indigenous females, on the other hand, are performing not far below the rate for non-Indigenous males (57.6% vs 62%). From another perspective, it appears that the gender effect is twice as great for Indigenous males - a gap of 29% (33% vs 62%) as for Indigenous females - a gap of only 12.4% (57.6% % vs 70.5%). Clearly, the main finding is the significant under-achievement of Indigenous males (which may be interacting with the lower withdrawal rate which results in an FA grade, as we have seen in the previous section).

Fig. 9.2 Gender by Age Group Interaction

Proportion Passing Common Unit: All Enrolments (1999-2002)

(Error Bars show 95% Confidence Interval of Mean)

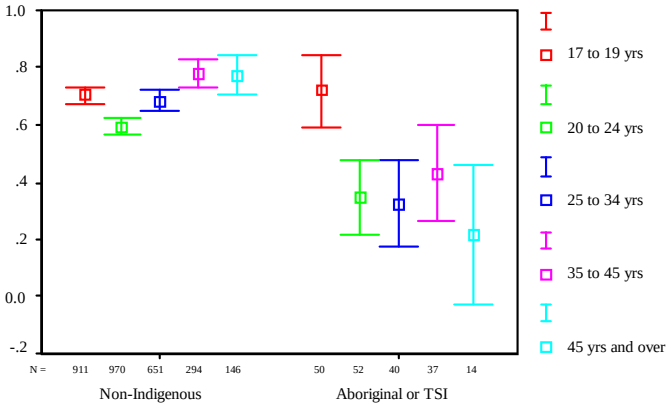


Age Group

Equally important are the differences exposed by a similar interaction analysis of gender effects across the various age groups. The interaction of these two effects in the error bar analysis displayed in Fig. 9.2 indicates that the gender gap in passing a unit is consistently much smaller among younger (ie. under 25 yrs) groups. This observation appears to hold, even allowing for the "dip" in the general performance of the second youngest group (a significant source of concern in itself). The widest gender gap appears to be between males and females aged 25-34 yrs 15% (56.8% vs 74.5%) - compared with only 4.7 % between males and females aged 17-19yrs(66% vs 70.7%). This is almost a threefold relative difference and certainly worthy of further consideration and explanation. Another interaction of interest that remains to be explored here is that between Indigenous status and Age Group. Here the Age Effect for Indigenous enrolment cuts in very early after age 20. The average for the school-leaver group (17-19 yrs) would appear to be quite comparable with that for non-indigenous enrolments. This is encouraging, but the rapid decline in the pass rate to below 50 percent thereafter is an issue which must be addressed.

Fig. 9.3 Age and Indigenous Status Interaction

Proportion Passing Common Unit: All Enrolments 1999-2001



Indigenous

(Error Bars show 95% Confidence Interval)

These three exploratory analyses suggest that interaction effects may be both important and pervasive in identifying the groups which may require specific treatment or "targeting" within the Common Unit Program. While the bivariate analysis is more useful than a simple distribution of scores, and a multivariate regression analysis provides more insight than a scattergram or bar chart, the interaction analysis in turn allows for much more specific analysis of the determinants of success and failure. The analytical problem with this fine-grained form of analysis, is its potential to multiply into a infinite fragmentation of groups and subgroups as the values of each predictor is allowed to combine with those of every other. Ten dichotomous predictors, for example, would generate 1024 (2^{10}) potential groupings, while the addition of multiple-category variables (like age group) would raise this ceiling five-fold. One might, of course, reduce the number of predictors to a select handful on the basis of their significance in a regression procedure. However, eliminating predictors on the basis of a single prediction equation reduces the richness of the background field of interdependence among the predictors and therefore often fails to map the complex pathways which lead to success or failure.

"Market" Segments: Data-Mining Student Results

What is needed therefore, is a statistical procedure which could probe the complexity that is generated by the interaction analysis approach. Such a method would work selectively through the combinatorial possibilities to deliver a useable and limited number of major segments in the client group rather than an unmanageable proliferation of fragments. The response to this need is to be found in the burgeoning field of data mining. This is a generic term covering a number of inductive techniques which make no assumptions as to the theoretical basis of prediction but define a field of inter-relationships on the basis of a single outcome (e.g decision to purchase, to vote for a party). This approach therefore appears to be particularly appropriate to the kind of problem defined here, namely to track the causal background to passing or failing a common unit. The aim here is not so much to test causal hypotheses over a whole range of possibilities, but rather to identify a limited number of segments defined in terms of their unique combination of values of the predictors. Because this procedure is so exhaustive and to some extent illustrative, this analysis will be concerned with the prediction of only one outcome, i.e. passing a unit.

The CHAID (**C**hi-square **A**utomatic **I**nteraction **D**etection) program, which is available as a module to SPSS, was chosen as the most appropriate data-mining algorithm for exploring the deeper levels of interactions in this sample. This program lends itself very well to clustering a population according to its relationship with a dichotomous outcome (e.g. passing/ failing) and makes no assumptions as to underlying distributions of the variables, using the same logistic regression method as the models developed above.

This program is described in its manual (SPSS, CHAID, Release 6) as follows:

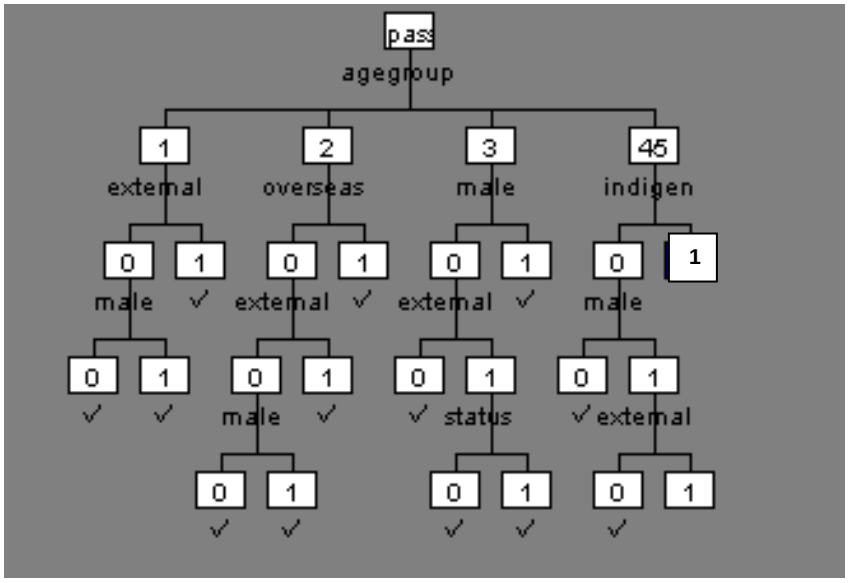
> CHAID divides a population into two or more distinct groups based on categories of the "best" predictor of a dependent variable. It then splits each of the groups into smaller groups based on other predictor variables. This splitting process continues until no more statistically significant predictors can be found (or until some other stopping rule is met). CHAID displays the final subgroups (**segments**) on an easy-to-understand tree diagram.
>
> The segments that CHAID derives are **mutually exclusive** and **exhaustive**. That is, segments do not overlap, and each population unit (case) is contained in exactly one segment. In addition, since segments are defined by combinations of predictor variables, you

> can easily classify each case into its appropriate segment simply by knowing the categories of the predictors (1993, p.3).

The segments generated by the tree diagram can then each be ranked in what is called a "gains chart", in the order of their "success rate" i.e. the extent to which they fulfil the criterion of the dependent variable (in this case gaining a pass conceded or higher in a Common Unit). The tree diagram identifies the hierarchy of effect as each subgroup (defined by its combination of values) is successively split up according to the categories of the most powerful predictor of the membership of each segment (as against the rest of the sample). The branching terminates when no further significant predictor variable can be found among the variables not already used within that branch. The branching method can reveal just how complex (non-homogeneous or lumpy) the field of prediction can be. Important predictive pathways that may have been otherwise disguised within an orthodox regression analysis can define sub-groupings which often defy an additive logic which assumes that effects operate equally across all values of a variable.

The automatic interaction analysis therefore lends itself to the task of identifying not only the combination of factors, but also, more precisely, the combination of values or categories within these factors that predict passing or failing a unit. The gains chart will show the numbers and proportions of cases that fall within each segment ranked according to their pass rates. The results of the CHAID analysis for all the enrolments for 1999-2002 are displayed in Fig. 9.4 (tree chart) and Table 9.1 (Gains Chart), for predicting a pass grade (or higher) from the most important and enduring student characteristics.

Fig 9.4: Tree Chart of Segmentation Analysis of Predicting Pass+ Grade from Selected Student Characteristics: Common Unit Enrolments, 1999-2002)



The CHAID analysis reveals some interesting results among the fifteen final segments produced by the procedure. The two result displays, the tree chart and the gains chart should be read together. The procedure outlined above generates splits until it runs out of predictors that are statistically significant. Each of the final segments (here there are fifteen) is given an identification number (ID) in left to right column order (ignoring their row position on the tree). Thus no 1 segment is the box on the far left of the tree chart, whose path indicates that it is the product of three splits – first on the basis of age (17—19yr age group), then of mode of study (the 0 indicates internal mode) and then of gender (0 = female). The final segment with the highest ID (no. 15) is on the far right of the diagram, two branches down from the top, defining the group with an age 35 yrs), and Indigenous identity (Indigenous). Segments are numbered in the complete program output which is too large and detailed to be shown here. In this case, however, the first thirteen segments are identified from the check (tick) marks under each in Fig. 8, indicating that the analysis has been closed off, since no predictor can be found which can meet the criterion for significance ($p<.05$) of prediction. In the case of the segments 14 and 15, however, the absence of check marks indicates that the numbers are below an acceptable level for analysis when split by the next predictor (e.g. there were only 28 indigenous external male enrolments, or only 0.6% or the total).

Table 9.1 Segments Predicting Pass Rate: All Enrolments, 1999-2002 (N=4719) (based on Fig. 9.4)

Segment Definition (Path)	*Segment (ID)*	*Size of Segment*	*% of total sample*	*% Passing Unit*
1. 35+ yrs/non-Indigenous/female	12	546	11.6	81.14
2. 25-34yrs/female/internal	8	294	6.2	78.57
3. 35+ yrs/non-Indigenous/male/internal	13	114	2.4	78.07
4. 25-34yrs/female/external/part-time	10	270	5.7	75.93
5. 24yrs/overseas	7	127	2.7	74.8
6. 17-19yrs/ internal/female	1	804	17	73.88
7. 17-19yrs/internal/male	2	394	8.3	68.27
8. 20-24yrs/non-Overseas/internal/female	4	518	11	63.51
9, 25-34yrs/female/external/full-time	9	138	2.9	63.04
10. 35+yrs/non-Indigenous/male/external	14	96	2	62.5
11. 25-34yrs/non-Overseas/male	11	414	8.8	56.76
12. 20-24yrs/non-Overseas/internal/male	5	356	7.5	54.21
13. 20-24yrs/non-Overseas/external	6	433	9.2	50.81
14. 17-19yrs/external/male	3	150	3.2	46.67
15. Indigenous/35yrs+	15	65	1.4	41.54

The gains chart (Table 9.1) summarises the results of the tree diagram. Each segment is ranked in descending order according to the proportion of enrolments in that segment that have awarded a pass or higher grade (shown in the column on the far right). The other columns, from left to right, show the definitions of each of the fifteen segments as it is arrived at through successive paths splits, its ID and the number and proportion of the total enrolments in each segment. This chart is therefore basic to an understanding of the final "carve up" of the whole sample of the enrolment into definable subgroups according to their individual prediction of passing a unit. These segments may be compared with those yielded by clustering analysis and related techniques. However they have the added advantage of being grounded in the categories of a dependent variable, which clusters and factor scores are not. They therefore represent an amalgam of both regression and clustering methods in defining the target population on the basis of a specific and simple outcome.

In this analysis, the age group (or bracket) emerges as the most important initial base of segmentation or first split. At this point it appears that the distinction between groups 4 (35-44yrs) and 5 (45 + yrs) are collapsed for predicting passing a unit. While the first split is by one variable, the second split of the four age groups identifies four different bases for selecting the next most significant predictor. The youngest group (17-19yrs), is split first on the basis of mode of delivery, which produces a very large gap of 25.4% between external and internal enrolments (internal 72%, external 46.7%) and then a much smaller one of gender (73. 9% for females, 68.3% for males.) The age group 20-24 yrs has quite a low rate of success (only 58.3%) and is split on the basis of citizenship (74.8% for overseas vs 56.8% for Australian or NZ citizenship) and only then by mode of delivery (almost 10% favouring internal over external enrolments) and finally on gender (9.3% favouring female).

The third oldest age group (25-34yrs), whose performances are about average for the whole sample, is split first (and quite dramatically) on the basis of gender with a gap of 17.74% (74.5% female vs 56.76% male), and then by mode of delivery (7% favouring internal) and finally part-time status (with part-timers performing almost 13% better than full timers 76% part-time vs 63% full-time). The oldest group (35 + yrs), which generally performs very well with pass rate of over 75%, is split quite dramatically on the basis of Indigenous identity, with a difference of almost 37% in pass rate (78% non-Indigenous, 41% Indigenous, and then on gender (with females in this group outperforming all other segments with a rate of 81.14%. The males in this final branch are split widely on mode of delivery, where internally-studying males outperform their externally-studying fellows by over 15% (78% internal vs 62.5% external.

Because the data mining is primarily a heuristic and inductive- rather than a theoretically informed methodology, it is better attuned to revealing a mix of effects which are often startling in their defiance of conventional wisdom. Two such examples are the superior performance of overseas enrolments in the 20-24yr group, and of part-time external female students in the 25-34yr-age bracket. Although being male, indigenous and studying in the external mode have almost universally negative effects on a segments pass rate, these effect are not felt uniformly, nor in equal strength across different subclasses of age, gender, ethnicity or mode of delivery. Rather, each segment represents a different area within a complex patchwork of combinations of effects, which suggests the need for a more precise response to the calculus of risk. The analysis identified some areas which seem particularly acute, as shown in the dramatic differences in pass rates among broadly similar demographic groups.

X SUMMARY, KEY ISSUES AND RECOMMENDATIONS

The main aim of this study, as set out in the introduction, was to identify the main predictors of student attrition (withdrawal and failure) in Common Units, from a number of independent variables (socio-demographic, situational, pedagogic). The results of this exercise were to form the basis of a set of recommendations for consideration by the Common Units Committee. The specification of the predictive model was to be based on a review of the literature of the predictors of student outcomes (including satisfaction and attitudes) in similar programs and in higher education as a whole. Student attributes included age, gender, language background, ethnicity and citizenship, situational variables such as first year of study, part-time status, field of study, as well as learning-related variables such as mode of unit delivery (including comparison of effects) of online vs print media. While the original impetus to the study was the issue of high rates of failure (usually non-completion) among externally enrolled students, the investigation required a fully-enumerated database which included internal students, as the basis for making statistical inference about the effect of mode of delivery and its relationship to any other effect such as age or gender. The investigation, as a side benefit, produced a comprehensive analysis of the entire background to student performance in the program.

What began as an exercise in empirical prediction of the background to withdrawal and failure rates in the NTU/CDU Common Units has therefore turned out to be a more revealing study of the patterns and trends of student response in a compulsory and universal program. We have seen that the student response to Common Units is deeply embedded not only in situational and socio-demographic factors which may define an input, but also in their interplay with the pedagogic features of the program such as content, modes of delivery, and styles of learning. This interplay in turn generates a range of "soft" or hard-to-measure outcomes which can be decisive in predicting decisions to withdraw or poor performance. Levels of student satisfaction, perceptions of the program as well as general attitudes to both the program and the University as a whole shape the student experience in ways which are less deterministic and not so easily-captured by official statistics. They are no less decisive than the socio-demographic and situational variables which are more easily captured through official data sets.

An understanding of these mediating and emergent effects may be, in the end, the key to successful program development and delivery. As such, they must be included in any set of recommendations which may flow from a review of the literature or a statistical model-testing exercise on which it has been based. While the present study has no more than scratched the surface by sketching out the lineaments of a model which might connect predictive variables, student experience and performance outcomes in the Common Units, it has, however, exposed a set of issues which go to the heart of the experience of the Common Unit program. These issues emerge from a number of contradictions which are inherent in the functions of any modern university which delivers a variety of courses to a diverse student population in a range of modes of delivery and contexts of teaching and learning. Because the Common Unit program has been developed as a response to the tendencies towards fragmentation within the contemporary tertiary sector, they have inevitably left their imprints on the way the program has been structured, marketed, delivered and perceived. Conversely, the Common Units Program provides

an ideal site for the resolution of these tensions and dilemmas at a level not available elsewhere and may hold lessons for the evolution of teaching and learning across the University. The identification of these key issues will form the basis of a recommended response to the problem of attrition and related problems surrounding the Common Unit program.

This chapter will therefore:

1. Summarise the main findings of the study
2. Identify and discuss the key issues implied by the findings
3. Propose recommendations arising from this discussion

Main Findings of this Study

The following table (Table 10.1) summarises the principal findings of this report. The attached references indicate the main sources of evidence for the conclusions given in the cells, and are no substitute for the full discussions of the often-complex arguments set out in the text of the previous chapters. In this table the main lines of influence on attrition may be more clearly discerned, set beside the less accessible or "softer" outcomes which cannot be reduced to indices of input (socio-demographic characteristics) or of output (withdrawal and academic performance). While the theoretical linkages have been set out in the form of the generic model (Chapter VII) it is now time to draw the empirical evidence together, so that input, throughput and output, may be seen as phases of a complex but holistic process. We will now examine this table in more detail, making appropriate connections from which key issues for policy and practice in the Common Units program may be defined and addressed. How does the generic model, derived from the various strands of available literature, help us to interpret the empirical evidence coming out of the Common Unit program?

Socio-Demographic Effects

Age appears as the most dominant effect on outcomes of all types. Because of its strong interactions with gender, part-time status and mode of study, it has not been adequately studied in the empirical literature on outcomes. The regression analyses of student satisfaction and of student performance in Common Units show that, when these other effects have been controlled for, it appears that younger students (age below 25 yrs) are both less satisfied and are more likely to fail a common unit. As seen in the breakdown with gender (see below), the main problem appears to be within the 20-24 yr age group rather than in the younger group (17-19 yrs), presumably mainly composed of school leavers. The interaction with gender is quite important here, since the preponderance of females in the upper age brackets (evidenced in their narrower confidence levels) appears to be a factor in pulling up the average for the older students. However, the gender gap conceals the much poorer performance of students, both male and female in the 20-24 age group. The other various terms which interact with age are shown in the Tree Chart (Fig. 9.4), where we see that its most important interactions, moving from younger to older groups, are – mode of study (17-19 yrs), overseas citizenship (20-24 yrs), gender (25-34 yrs) and Indigenous status (35 and older).

Male gender stands out as having consistently negative effects on outcomes in the Common Units, with the possible exception of decision to withdraw. This finding is entirely consistent with the predictions from the First Year on Campus Study and a host of other reports and investigations both in Australia and in other developed countries. Judging from cohort studies of participation at Year 12 and in HE and trends in TE scores and graduations, the gender gap seems to be increasing rather than diminishing. This effect is quite noticeable, with the gender gap in the pass rate of almost 10 percent (70 percent female vs 60.4 percent male). This correlation between gender and performance can have an overwhelming effect at the extremes – for example, when compounded with the higher participation rate of females (two out of every three students are women), we find that eighty percent of High Distinctions are female. However, the gap does vary across the age groups, as discussed above, and illustrated in Fig 9.4. It appears to increase in the over 25 yrs age groups, where the higher performance of females pull up the older student average, while males exhibit a much smaller improvement.

Indigenous Status also exerts a consistently negative effect on academic outcomes, though not apparently on levels of satisfaction. The academic effect is very great, however, and is particularly acute in the older age groups – in fact, the pass rate for Indigenous school leavers are no lower than for those for non-Indigenous (Fig. 9.3). So great is the decline that it would appear that failure is almost the average result for Indigenous students, with pass rates consistently under 50 percent. The gender gap applies here as well, as seen above in the exploration of interaction effects of Indigenous status in Fig. 9.1. So when the various interactions of age and gender are compounded, Indigenous status for males over 20 yrs achieve a pass rate only just over 30%. This is clearly an unacceptable outcome from any perspective, whether on academic or social justice grounds, and its causes and potential remedies deserve further consideration. One of the possible contributing factors to these rates, as we have seen (Table 8.5), is the tendency of Indigenous students not to withdraw from the program before census date, and therefore to be more likely to receive an FA grade. This is a certainly an area for intervention.

Table 10.1 Summary Table of Predicted and Observed Effects on Student Outcomes†

Type of Predictor		Effect on Satisfaction (Predicted) [a]	Effect on Performance (Predicted) [b/c]	Effect on Satisfaction (Observed) [e/h]	Effect on Continuing Enrolment (Observed) [j]	Effect on Passing Unit (Observed) [i]	Main Interaction Variables with Passing a Common Unit [k]
Socio-Demogr.	*Male Gender*	Negative	Negative	Not Significant	Not Significant	Negative	Age, External, Overseas, Indig.
	Young - aged under 25 yrs	Negative	Not Examined [d]	Negative	Positive	Negative	External, Male Overseas, Indig.
	Indigenous Status	Unknown	Negative	Not Significant	Positive	Negative [l]	Age, Gender External
	Overseas Cit'ship	Negative	Positive	Not Significant	Not Significant	Not Significant	Age, External, Male
	Non-English Speak.Back.	Not Examined	Positive	Not Significant	Not Significant	Not Significant	N/A
	Rural Location	No Evidence	Negative	Not Significant	Not Significant (NT/Non-NT Residence)	Not Significant (NT Res.)	N/A
Situational	*1st Year of Study*	Negative	Negative	Not Observed	Not Significant	Not Significant	N/A
	Part Time Status	Negative	Negative [d]	Not Observed	Positive	Not Significant	N/A
	Field of Study	Inconclusive (Depends on Institution)	Not Examined	Science Neg. Business and Education Pos.	Hlth, Soc &Cult. both Positive	Hlth Pos. Soc&Cult Neg.	Not Examined
Pedagogic	*External Mode*	Positive [g]	Inconclusive [f] "No Significant Difference"	Not Sign. (if age is controlled for)	Positive	Negative	Age, Male, Overseas, Inidig.
	Online (as main medium)	Negative [g]	Inconclusive [f] "No Significant Difference"	Not Observed (but positive response)	Insufficient Data	Insufficient Data	N/A
General Program		N/A	N/A	Neutral	Negative	Negative	N/A

[a] McInnis & James, 1995, pp. 146-150 ; [b] Marks, Fleming, Long and McMillan, 2000; [c] Considine & Zappalà, 2002; [d] age usually confounded with p/t status see Taylor & White, 1991; [e] Baldwin & McInnis, 2000; [f] Phillips & Merisotis, 1999
[g] Murdoch University web pages at www.tlc.murdoch.edu.au/eddev/evaluation; see also Brabazon, 2002, for Murdoch online experience
[h] Table 2.6 above - Results of Regression Analysis from Student Survey 1999
[i] Table 4.5 above - Results of Logistic Regression Predicting Pass or Higher in Common Units
[j] Table 4.6 above – Results of Logistic Regression Predicting Decision to Withdraw before Census Date
[k] Fig. 8 above – Tree Chart of Segmentation Analysis Predicting Pass Grade in Common Units
[l] See also Table 4.8 above – Class of Failure Grade and Indigenous Identity (Predicts FA rather than F for Indig. Enrolments)

†Observed effects indicate significant coefficients in the relevant multivariate predictive model, i.e. when adjustment has been made for effect of other relevant variables; superscript references in column headings (and some cells) provide main support for cell values (see above)

Overseas Citizenship, Non-English Speaking Background would not appear to be major sources of disadvantage, though their relationship is sometimes complex. In the official NTU/CDU database there is a strong association, though by no means perfect, association between these two predictors. Sixty percent of overseas citizenship enrolment is NESB, while almost 38 percent of NESB students have overseas citizenship, resulting in a correlation of +.438. Overseas citizenship may actually be seen as an advantage. It is associated with a pass rate of 73 percent, the highest category among all the breakdown groups (Table 8.1) compared with only 66.2 percent for enrolments identified with Australian or New Zealand citizenship. The higher pass rate for enrolments from students with overseas citizenship appears to be consistent with the prediction from the literature. However, this evidence is drawn from second-generation samples of immigrants, not from those living in Australia on student visas. When other factors such as age, gender and field of education are controlled for in the NTU/CDU predictive study, the association between overseas citizenship and passing a Common Unit ceases to be significant at the required level ($p<.05$) (Table 8.2). This variable enters the segmentation analysis in its association with the 20-24 yr age group, external mode of study and last of all, with male gender. It does not have any predictive effect on either satisfaction level (Table 5.2) with the program, or with decision to withdraw before the census date (Table 8.3). All in all, its effects would appear to be neutral or at best, only slightly positive.

Despite its correlation with overseas citizenship, NESB enrolments are associated with a 2.1 percent lower pass rate than that for native speakers. However, this small gap was not statistically significant and this variable was therefore not included in the regressions predicting academic performance in the Common Units. However, in the student survey, non-English-speaking background was found to be negatively associated with satisfaction with the program when other relevant variables, including overseas citizenship were controlled for (Table 5.2). While the predicted relationship was not high ($\beta = -.164$), there would appear to be a need for further exploration of this issue. It is probable that this variable is more closely associated with satisfaction levels with the program (perceptions of the amount of reading material might be a factor here), rather than with academic result. The fact that this variable has an independent effect on satisfaction levels when overseas citizenship is controlled for suggests that these two variables should be treated as separate dimensions of advantage/ disadvantage when predicting outcomes among student, as distinct from immigrant, populations.

Rural Location was found to be a slippery concept to operationalise in the NTU/CDU context, where many NT rural students choose to live in Darwin and where a large number of enrolments, in both modes of delivery, are from interstate. The metropolitan/ rural divide, even based on the postal codes of home addresses could therefore be quite misleading. For the student surveys, present location was measured by a three-category scale – Darwin, Outer Darwin and Other. This variable had no effect on levels of student satisfaction. For the prediction of passing a unit, a simple split was made between NT and non-NT home residence by home postcode. NT residence was associated with a negligible difference in pass rate (.5 percent) and was therefore not included in the predictor list for regressions. Though Darwin itself may, for some demographic purposes be treated as a metropolitan location, the instability of residence status for many students between ages 17-30 yrs renders this distinction problematic in the NT context. Clearly more detailed work would need to be done on this variable to adapt it to NT conditions and this may require the use of proxy measures such as schooling experience and family background.

Situational Variables

First Year of Study, despite being conventionally seen as a major challenge to the bulk of students (and the subject of the *First Year on Campus* report (McInnis & James, 1995), is associated with a slightly higher, though not statistically significant, pass rate (67.5 for first year of enrolment vs 65.1 for later years). First year enrolments have a significantly higher rate of withdrawal, though this is not apparently associated with mode of delivery, which is about the same (20 percent). The similarity in pass rate is rather surprising, since it is often assumed that first year students lack the skills which the Common Units are intended to impart. Again, if age is correlated with performance and if first year students tend to be younger than those in later years of enrolment (average age is 25 yrs vs 28.5yrs for other enrolment categories), this would appear to be an anomalous outcome. One may only make an educated guess here that the relationship between the first year of study and academic performance is being distorted by technical factors which are not specified in the predictive model.

First, there is the possibility that many "advanced level" students are not in fact equivalent to traditional first years in full-time study. Many of these enrolments come from part-time and external, taking the subject in the second year, and sometimes the third year of enrolment. In terms of achievement (no of units passed), these students may be therefore only at the stage of the second semester of the first year full-time. Second, there is substantial anecdotal evidence that many students defer enrolment in the Common Units (perhaps reflected in the higher rate of first year withdrawals), until they have completed the core requirements of their main course of studies. Such students may lack the commitment and interest for a program which was not primarily designed for their needs and are more likely to underperform. Third, while the mean age of first year enrolments may be 25 yrs, the under 25 yr age group is by no means homogeneous. It should be noted (Fig. 4.7) that the school-leaver age bracket, i.e. 17-19 years, which accounts for 37 percent of the first year Common Unit enrolments, performs quite well, particularly in comparison with the next age group 20-24 years (25 percent of enrolments).

In summary, it would appear that the stereotypical image of the first year student in the program as a school leaver making a rapid transition in study habits and life style is difficult to impose in the case of the Common Unit program. In the face of diversity of intake, flexibility of and an increasingly calculative student population, the categories of the traditional university population would appear to be breaking down here, as in other areas of higher education.

Part-time Status is associated with a significantly lower rate of withdrawals (23 percent vs 37 percent for full-time and significant in the regression as well), but not with the pass rate in the program (67 percent pass rate vs 66.6 percent, not included in the regression). This is perhaps unusual, given the negative effect predicted for the hours of paid work in the *First Year on Campus* study on satisfaction and motivation variables. This variable enters into the segmentation analysis only for externally studying females, where it appears to have a positive effect in the 25-34 yr age group (ranked 4 out of 15 in pass rate, Table 4.10). Apart from this small segment (only 5.7% of the total sample), this variable does not appear, therefore, to be strongly associated with performance outcomes. Despite the fact that two-thirds of part-time enrolments have opted for an external mode of delivery, which is associated with a lower pass rate. Age is also a factor here, with the average age of part-time enrolments being 31 yrs, compared with only 24.5 yrs for full-time.

The same observations with regard to the variation in performance within the under 25 year group made for the first year of study would appear to apply here, compensating for the effect of negative associations (with under 25 yrs and external mode) to produce a similar pass rate across the part-time/ full-time divide. In this connection it is significant that 93.3 percent of the enrolments from the school-leaver age bracket (17-19 yrs) in the common units are full-time status, while about a third of full-time enrolments fall in the first year of studies. This conjunction of associations among the predictors, mode of delivery, age and attendance status would appear to define two clusters – on the one hand a fairly homogeneous and reasonably-achieving school-leaver / internal delivery mode cluster and on the other a mature age (20 yr plus) population, fragmented by the intersections of citizenship, Indigeneity, age, mode of delivery as well as by the differential effects of gender.

Field of Education (FOE) has significant effects in the Common Units program on both the decision to withdraw before census date and pass rate. The field which rates most highly and consistently on both these indicators is Health Sciences, which has a much lower rate of withdrawal (27.3 percent vs 33.8 percent average for the whole sample) and a high pass rate (71 percent vs 67.7 percent overall). The next highest performing field is Education, with a higher than average rate of withdrawals (35.8 percent) but the highest pass rate (71.3 percent). Even when controlling for gender and age effects, the coefficients for these outcomes are still significant, particularly on the prediction of pass rate from the Health Sciences category, with an odds ratio forty-percent greater than expected. The Social and Cultural studies field has the lowest pass rate, at only 62.5 percent. Again, this association stands up after controlling for the other variables as indicated by an odds ratio of just under eighty-percent of the expected or average for the whole sample. Business field enrolments perform slightly worse in pass rate at 64.7%), though this is not significant (Business field students, however, had the highest levels of satisfaction in the external evaluation study) and this category was not included in the regression analysis.

In sum, therefore, in this program and institution, even when controlling for gender, age, mode of delivery, indigenous status and other predictors, it must be concluded that the more professionally-oriented fields of health and education/teaching appear to have more positive effects on the key attritional outcomes, withdrawal and pass rates. It is perhaps significant, by the same token, given the orientation of the content in many of the Common Units to literary, historical and cultural topics, that the pass rate for enrolments coming from the social and cultural field should show a negative coefficient, when all the other predictors have been controlled for. One might conclude that the operant factor is the higher motivation and focus of students enrolled in the more structured, vocational degree programs.

Pedagogic Variables

External Mode of Delivery increases rather than reduces the complexity of the client group based on the prior socio-demographic of age, gender, overseas citizenship and Indigeneity. Because these variables are so difficult to control for, as in classical experimental design, it is perhaps no wonder that its effect on student outcomes, both processual and productive, are so indeterminate and the empirical evidence surrounding it so inconclusive and yet so controversial. Several conclusions emerge from the review of the literature the "No Significant Difference" debate as well as from the empirical analysis of student surveys and patterns of attrition in the Common Units program:

(1) External mode of delivery is positively associated with levels of student satisfaction with the program. This is true for the survey of similar cognate Foundation Studies units at Murdoch,

as well as for the 1999 survey of the Common Units. However, this variable loses statistical significance when other variables (age, gender, part-time status and others are controlled for (Table 2.6).

(2) External mode of study is negatively associated with decision to withdraw from a Common Unit, a desirable outcome. However it is also associated with a higher fail rate, where the gap between internal and external modes is, on the average, 7.5 percent. These effects are quite robust and remain as very significant in the regression analyses (at $p<.0001$) where a range of other key variables is controlled for (Tables 8.2 and 8.3).

(3) The effects of mode of delivery are often contradictory, even when other variables are controlled for. It is a positive influence in some combinations enrolments part-time, female gender and aged 25-34 – pass rate 76%) and a negative influence in others (male gender, aged 17-19 yrs).

(4) There is no apparent connection between the lower rate of withdrawals from external enrolments and their higher failure rate, as manifested in a higher proportion of their results indicating incomplete work (Failed Absent) rather than a straight Fail grade.

The only conclusion that one could come to with this effect is that external mode of delivery is a negative influence on academic performance in the common units in its own right. In other words, it cannot be explained simply in terms of its prior associations with correlates with socio-demographic or purely situational factors, though these may amplify, suppress or complicate its primary and independent effect. The search for an X factor that may turn this negative effect around, or at least mitigate it, would seem to be illusory at present, given the indeterminate nature of its effect, the difficulty of conducting controlled experiments and the variety of interactions between pedagogic and non-pedagogic effects which can impact on student experience and performance in naturalistic settings.

Online Delivery presents a subset of difficulties associated with estimating the effect of external or off-campus modes in general. While the early 1990s saw a great deal of excitement generated by the technological innovations of the digital and Internet revolutions in global communications, their acceptance by both students and academic staff in higher education has been patchy and problematic, and on the whole, negative. Not only are the technological hurdles seen to be insuperable for many students, but also the quality of experience is often seen as a poor substitute for face-to-face teaching and not as flexible in its uses as print-based media. The only survey included in the review, from Murdoch University, indicates that this form of delivery meets with better student acceptance if it is complementary to other media (only 13 per cent of respondents opted for total online). The two Common Units that have been offered online, within the time frame of this study, have been CUC104 (Northern Exposure) and CUC105 (Cultural Studies), which, on reports, have been met positively, though these are now to be phased out. Because of the relatively small numbers of enrolments that these units had generated on the database, the effects of this mode on withdrawal and pass rates were not systematically explored, particularly since it is so embedded with the other issues arising from external modes of delivery.

Despite these *caveats*, an exploratory analysis for this section was carried out for all units, allowing a comparison of pass rates in external and internal modes in one year (2002) when CUC104 and CUC105 were on offer for the second or third time. The initial results for the new technology are not encouraging for this mode of delivery. Overall, it appears that pass rates in these two online

units are among the lowest of all units in either mode of delivery, though by no means disastrously so. The lowest pass rate for all modes and units was for CUC105 online (60.9 percent) while the second lowest for external mode is for CUC104. Ironically, however, these units maintain the pass rates for their internal modes. This may appear to be disappointing outcome, given the amount of resources involved in online development, but it may conceal some lessons for future translations between modes. These units generated a great deal of interest in their online mode, both within and outside the university and it may be the higher rates of internal passes in these units were an unintended outcome of the availability of online resources.

What can be concluded from this summary of the results of this rather lengthy and complex analysis? The main finding would appear to be that the antecedents of attrition elude any simplistic reduction to one or two determinants based on socio-demographic, situational or pedagogic factors. Their effects, as we have seen, are either contradictory (the predictors of withdrawal mirror those of academic performance) or unpredictably intertwined in complex interactions. On a more positive note, there is the need for coordinators, lecturers and tutors to recognise the reality of these factors on student outcomes through a thorough reading of the evidence of the ways these variables impact on the teaching and learning experience.

If one were to sum up the main findings, it would seem that male gender and age grouping stand out as the most prevalent (in numbers of students affected) negative influence on academic performance, though the effects of both are so embedded with other variables as to render a simplistic statement of cause and effect based on just one of these predictors fairly meaningless. The same could be said about all of the other predictors particularly in the case of Indigenous status. Though this variable is overall a very strong predictor of receiving a fail result, its interaction with other variables such as age grouping is quite decisive (the overall rate of success for Indigenous school-leaver enrolments (17-19 yrs) would appear to be equal to that of the non-Indigenous enrolments in the same category). It follows that the most informed approach for intervention would be found in something like the segmentation analysis (Table 9.1, based on Figure 9.4), based on unique combinations of predictor values, rather than on classifications built around the single dimensions of disadvantage such as age, gender, race or ethnic background. In this respect educational planning might well learn from the insights of market analysis.

Key Issues and Recommendations

The points made across the board in such a complex set of analyses which cover so many blocks of variables, can be more effectively thematised in terms of a handful of key issues for the purposes of recommending action for delivery and development of the Common Unit program. As pointed out above, it is often useful to identify these as a set of underlying tensions which define the directions which the program will take when translated into operational decisions, both managerial and pedagogic. These may be enumerated in terms of a number of headings:

1) *Unit Content – General Education vs Skills Formation*. This is perhaps a false opposition, but the lack of consistency in this area, as noted by the different emphases in the founding documents of the program by the external evaluators, has been the source of a good deal of confusion in unit development and assessment methodologies. Such a tension is not unusual, since it underlies the genealogy of core or foundation courses throughout the tertiary sector, both in Australia and overseas. The collapse of the elective suite of general education units into one or two electives (CUC107), and of skills element into a single compulsory unit (Academic Literacies, CUC100) is a clear attempt to address this opposition in structural, but hopefully, more than mechanical, terms. The external evaluators' comment (Baldwin & McInnis, 2000) on the importance of maintaining

integration between these two objectives as they affect all aspects of unit development and delivery. This principle would appear to be fundamental for maintaining the balance between content, pedagogy and assessment methodology essential for the creative synergy between the two constitutive elements of the program.

***Recommendation**: That the Common Units Committee monitor the integration between the skills formation and general education elements of the Program under the new regime of reduced and specialised range of unit offerings.*

2) *Monitoring Strategy – Attitudes, Perceptions and Satisfaction vs Academic Performance.* What should be measured and monitored? How can the satisfaction levels of student evaluations be aligned with general attitudes to the student role, perceptions of the program and of the University? How can these "soft" outcomes in turn be aligned with outcomes? Should these be available as an integrated database without violating ethical constraints of privacy and confidentiality? Mechanisms are available through coding keys which could provide matches and merges across databases which address these two areas of concern. If these difficulties could be overcome, the foundations would be laid for a valuable monitoring strategy for a selective (say 20 percent sample) conducted by an independent external agency. Such an integrated relational database would be an invaluable resource not only for the Common Units Committee, but also for the University as whole.

***Recommendation**: That the Common Units Committee engage an external and independent agency to devise a comprehensive and multi-purpose monitoring and reporting strategy which addresses a range of outcomes at the student, unit and Program levels.*

3) *Policy Orientation – Diversity vs Equity.* The contemporary university is challenged by a new diversity of intake and consumer demand coupled with social, professional and legal obligations to ensure equity and transparency throughout its institutional processes. This tension impacts most dramatically on the Common Unit program, which is both universal and compulsory. The tensions here are multiple and cannot be readily encapsulated in terms of a single targeted policy which addresses the needs of one section of the client group to the neglect of others, unless justified by broader social and political objectives.

The sources of disadvantage identified above, whether gender- or age-related are so generalized that they cannot be addressed through the normal mechanisms of affirmative action, but must rather be stitched into the very fabric of "mainstream" practices. Moreover, these effects are not universally or equally felt by all students who may fall within a particular category. As we have seen, it is more realistic to see advantage or disadvantage in terms of a complex combination of factors which defines a particular segment of the student population. If one were to start somewhere, these segments, produced by a data-mining technique, might be a useful point of departure for devising a response to the multi-layered and complex needs of a diverse student body.

***Recommendation**: That the Common Units Committee consider strategies for meeting the diverse needs of the client population, defined in terms of its segmentations defined by the socio-demographic, situational and pedagogic determinants of academic performance*

4) *Delivery Strategy: Standardisation vs Individuation.* The diversity of needs of the student body leads naturally into a consideration of the delivery modes which are most appropriate for particular segments or categories of student, however defined. Here the dilemma appears to be strategic – whether resources should be diverted to off-campus and innovative media of flexible delivery, or concentrated into support for face-to-face teaching where individual needs are addressed on a personal basis between tutor and student. The evidence would appear to support a complementary role for the new media, rather than a wholesale move towards online delivery with tutorial communication by email or some other-mediated form.

   Once this principle is accepted, a rich range of delivery strategies are possible, through a graduated movement towards a harmonisation of approach, content, assessment and resources between internal and external modes. This mode of "flexible delivery" avoids the polarities implied by the "digital hemlock" and "no significant difference" debates of the past decade. Its endpoint would logically be an individuation of modality of student participation, within a range or mix of delivery options. Such a "cultural shift" in the core function of university life imposes radically new demands in terms of increased resources and the organisation of teaching and learning. However, in face of the complexity and diversity of student needs, this would seem like a desirable direction for the Common Unit program to explore.

   ***Recommendation**: That the Common Unit Committee explore the implications of a move towards a flexible delivery system available to all Common Unit students, with the objective of eventually dissolving the distinction between external and internal modes.*

5) ***Governance Structure**: Managerial Direction vs. Academic Autonomy.* Organisational literature abounds with examples of the tensions between bureaucratic and expert forms of authority and control. This issue is particularly relevant in the case of the Common Unit program, which has been initiated, resourced and restructured under senior management prerogative. While this "top-down" model of governance may have been originally justifiable on a number of grounds, it may not necessarily be the most appropriate model as the program matures. The future development of the program would appear, then, to require a more explicit protection of the academic functions of the Committee over such issues as program structure and elective choice. This may require a more explicit statement of the Committees own internal structures and processes, which should result in a more mainstreamed model of academic governance (perhaps along Faculty lines). Such a clarification would produce greater stability in program development and student perceptions. It might also provide a basis for the commitment of effort from academic staff that is essential to its long-term survival.

   ***Recommendation**: That the Common Units Committee seek to secure the long-term stability of its program through a review of its internal structures and their relationship to University Faculties and Divisions.*

Conclusion

The present investigation has not only charted the well-known contours of student responses to an innovative university program, but has opened up new and exciting directions of future development and exploration. The main message, perhaps, from the various studies and analyses reviewed or presented here is that the "one size fits all" model of program delivery is no longer appropriate, particularly for a compulsory and universal program catering for an extremely diverse and fragmented student body. While the predictors of success are by no means determinate of student response, they provide at least the grounds on which a more differentiated response to this diversity can be better articulated and managed. This response has obvious pedagogic implications, from the recognition of risk factors at the lecture theatre, tutorial or individual consultation to the selection of content and assessment methodologies and overall program design and integration of skills and general education components.

At a management level, there would appear to be a need for constant monitoring of the effectiveness of the program in terms of academic performance rates and other indicators of student response. In the middle ground between these two spheres is the emerging issue of flexible delivery, which has both deep pedagogic as well as costing and management implications. A graduated movement toward such a mode in Common Unit delivery, would appear to be both desirable on the grounds of equity, since it addresses the diversity within the distribution of student needs, abilities and interests, as well as providing a basis for the cooperative development of content, delivery and assessment across the institutionalised and often out-dated divisions of the traditional university.

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APPENDIX – REPORT OF 2003 QUALITATIVE SURVEY

In order to gain a more complete picture of the reasons for withdrawal from External Common Units the research team felt it was necessary to include students' perceptions of the individual units, in this way providing insight into whether there are connections between students' perception of the unit and their tendency to withdraw. It would also provide the opportunity to correlate demographic trends with students' perceptions and thus gauge whether certain types of students respond better to Common Units than others.

This component of the investigation was implemented through:

1/ A Consumer Exit Survey sent to all W and FA External Common Unit students over Semesters 1 & 2, 2002. (see attachment A)

2/ Students were also invited on the survey to provide phone /email details if they were willing to elaborate on their views further.

After a disappointing response from the Semester 1 cohort (9 responses) the next group were offered the incentive of entry into a $200 draw if they responded. This incentive was apparently not attractive enough as there were only 20 responses out of 292 . Of these, 7 were for CUC105, 3 for CUC104 and 6 for CUC102 and 4 Unit not indicated.

Thus, the data from these questionnaires did not provide a valid sample and we have been unable to incorporate the perspective " *non-completing external students perception of common units"*. The validity of the sample is effected by:

- Low number of returns due to poor return rate: 5 in Semester 1 and 10 in Semester 2.
- Small sample exacerbated by the fact that the returns dealt with a range of common units so that individual units were represented by less than 10 responses.
- Responses are likely to be extremely polarised given motivation would generally be fuelled by extreme views in favour of or against a unit.
- The units surveyed are not included in the 2004 Common Unit program so correlations between demographics and response to the content of these particular units is obsolete where Common Units are concerned.

Discussion

It is a well accepted that the response rate to evaluations administered to external students are generally poor (US Dept of Ed, 2003). Indeed the semester 1, 2003 evaluation collection for CUC100 typified this with only 43/400 external students responding as opposed to 97/150 internal responses where the audience is captive. Clearly the likelihood of students having any incentive to reflect on and take the effort to respond to a questionnaire concerning a unit they withdrew from in the first 4 weeks of the semester is low. Exceptions are likely to be where a student holds strong views about the unit and consequently responses are likely to be polarised.

However, it is still important that we include this perspective in future analysis of external student trends and thus solutions are found for gathering this data. Initial discussions have been held with the head of the student unit regarding the possibility of either: automatically posting a questionnaire to all external students on receipt of their withdrawal form or including (for entry into a database) more detailed questions on the withdrawal forms regarding reasons for withdrawal.