

**Pathways in Context:
Background Characteristics and Demographics in Student
Progression through Higher Education**

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ABSTRACT

Pathways in context: Background characteristics and demographics in student progression through higher education

This research develops a theory to explain the pathways taken by students through higher education in Australia. From a socio-ecological perspective, pathways are conceptualised as a diverse series of choices within learning contexts. In relation to Australian higher education, the model of pathways through undergraduate courses emphasises contexts in which personal and social factors contribute to the choices students make over time. A new method identifies and documents longitudinal pathways of progression through university degree courses. Higher education population data was examined over time to test the Pathways Theory of student progression. This unique detailed longitudinal approach documented *all* the pathway choices made by a cohort of students as they progressed in and out of their courses over time. Pathways were documented to the point of departure from a course and beyond, to include the extended pathways of students who returned to their courses following stop-outs and transfers. The results highlight the importance of a longitudinal approach in explaining pathways through specific course contexts. This research underlines the importance of considering context and diversity in student behaviours when using indicators of performance, retention and completion. Understanding the relationship between the personal and social characteristics of students and their specific learning contexts contributed to an understanding of the choice behaviour of students as they negotiated pathways through courses within the broader context of higher education.

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CHAPTER 1

RATIONALE

Students commencing university are a group of individuals, diverse in background characteristics and demographics. Each student, with their personal aspirations and appropriate academic credentials, makes a choice to commence their study within specific learning contexts. Over time further choices are made - choices to continue, to transfer, to stop-out or to withdraw. This project presents a theory of the diverse pathways that students take through the learning contexts of undergraduate degree courses. The background characteristics and demographics of students, the enrolment choices each student makes as they move from one learning context to another over time, and the resultant student performance outcomes, together present a complex combination of circumstances. This project argues for an inclusive theoretical framework relevant to Australian higher education from which these complex relationships can be examined. The terms *course* and *degree* are used synonymously here to refer to a program of units of study leading to an undergraduate award at the bachelor level.

Along with the general expansion of higher education in recent decades, there have been corresponding calls for institutional efficiency and effectiveness. In conjunction with this expansion, there has also been increasing pressure to develop better indicators of student performance outcomes as measures of institutional effectiveness. Such indicators have been developed in many OECD countries in recent years (Brennan & Shah, 2000; Organisation for Economic Cooperation and Development, 1998). In Australia, following government policy and economic influences, higher education has undergone a number of changes since the 1980s (Dawkins, 1987, 1988; Department of Employment, Education

and Training, 1993, 1995). These changes were accompanied by increased student participation, a corresponding increase in student diversity (Department of Employment, Education and Training, 1996; Dobson, Sharma, & Haydon, 1997; Parker et al., 1993) and greater attention to the management and planning of equity and access objectives (Australian Vice-Chancellors' Committee/Australian Committee of Directors and Principals in Advanced Education, 1988; Dawkins, 1988; Department of Employment, Education and Training, 1990). Within a climate of accountability, efficiency and evaluation, an increasing focus on student performance was accompanied by the use of a variety of indicators of student performance by governments and by universities in Australian higher education (Department of Education, Science and Training, 2001, 2004; Department of Education, Training and Youth Affairs, 1998a, 1998b, 1999c; Linke et al., 1991a; Welch, 2002). Student outcome performance indicators have been put to a variety of uses within a competitive higher education sector. As surrogate indicators of institutional quality, their uses include accountability to government for funding purposes, evaluation of course quality, information for prospective students, as well as provision of information for government policies and planning.

In higher education in other countries, such as the UK, there is corresponding interest in the use of indicators of student outcomes (Higher Education Funding Council for England, 1999a, 1999b, 2003; Yorke, 1987, 1991, 1998a, 1998c, 1999b). Although the structure, governance and funding of higher education is not comparable to that in Australia and in the UK (Cave, Hanney, Kogan, & Trevett, 1991; Welch, 2005), a large body of research literature in the US has also focused on performance and retention within colleges and universities

since the mid 1970s (Layzell, 1997; Pascarella & Terenzini, 1991; Tinto, 1993).

A key problem with current indicators of retention, performance and completion, is that the information they can convey at each year of a student's enrolment is limited. Students proceed in a variety of ways through higher education, following sometimes complex and varied patterns of progression over their years of enrolment. For many students, progression through a university course is uninterrupted, resulting in the completion of the course in the minimum possible time. However, other students take time out from their courses for a variety of reasons or withdraw from a course altogether. Indicators of performance outcomes used by governmental agencies are generally applied in a census-type cross-sectional approach at the macro data level. Such approaches are unable to convey important aspects such as the timing of course transfers, stop-outs and withdrawals evident at the individual data level. Cross-sectional approaches focus on recording separate aggregate yearly performances and overlook the longitudinal view of individual student progression through changing circumstances over time. Despite the wealth of attention to student progress, retention and completion, there has been little corresponding attention paid to developing indicators of individual student progression through the years of an undergraduate course. Recent work for the present project outlines a method for tracing longitudinal progression pathways from initial enrolment to final enrolment within courses (see Appendix A1, Robinson, 2004). This approach provides opportunities for a more informative perspective on progression.

A convenient means for documenting patterns of student progression or pathways of enrolment longitudinally allows new possibilities for research to unfold. If pathways of successive enrolment can be documented for each student,

then aspects of progression such as the timing of withdrawals, course transfers, stop-outs or return to study could be conveyed effectively. Such an approach would provide an accurate and detailed view of progression.

With information on the timing of enrolment changes over the years, academic staff would have the opportunity for continual monitoring of student outcomes within their courses. Knowledge of the stages in a course at which failures, stop-outs, transfers and withdrawals take place is an important part of adapting and improving the educational process. Background characteristics and demographics of students who begin a course can be linked to subsequent pathway choices and performance outcomes at any stage within an entire course enrolment. Student support services can also benefit from knowledge of longitudinal enrolment patterns, course completion and associated student characteristics. Information on the diversity of student pathways of progression through a course, on associated behaviour outcomes and student characteristics, allows both teaching and support services to be better informed on those students at risk of poor performance or withdrawal from studies.

A longitudinal study of student performance, of pathways of enrolment choice and associated student characteristics can provide vital information having implications for government policy and planning. A longitudinal approach provides a means for monitoring course progression outcomes of equity groups and a guide to assessing the effectiveness of admissions policies and selection criteria within different courses. Knowledge of the longitudinal pathways of progression across a student's complete enrolment history is crucial to the choice of appropriate admission criteria and the identification of student characteristics most likely to predict success. In essence, a longitudinal approach provides a

means of evaluating both the annual process of enrolment and the behaviour outcomes of student course progression. Although student pathways of enrolment choice may be influenced by a range of factors, pathway patterns at the individual data level provide information about completion and the timing of transfers and withdrawals over time from the first year of course enrolment. This approach has potential both internally within university, at faculty and course levels, as well as externally in the management and application of government policy to higher education.

A theoretical framework relevant to the Australian higher education system is essential as a basis for institutional analysis and for further research. In much of the previous research in this area, the theoretical basis is at best implicit or the models adopted are less relevant to an Australian higher education setting. Using available institutional data on student performance outcomes and student characteristics, this project develops a new approach to explaining progression and performance within an Australian educational setting. The intrapersonal processes driving progression outcomes are not within the scope of this research. In principle, the identification and documentation of pathway patterns of enrolment choices through undergraduate courses over time presents opportunities for systematically addressing vital issues in higher education.

Research in higher education has considered the diversity among institutions worldwide and also among institutions nationally. With student outcome data from institutional records, this project takes the context to the course level *within* an institution. What are these pathways students choose to take following course entry? What is the relationship between student background characteristics, their pathway choices and their learning contexts over time? What

background characteristics of students entering courses are associated with subsequent student outcomes of performance, completion and retention?

CHAPTER 2

A PERSPECTIVE ON STUDENT PROGRESSION

A university, with courses, policies, teaching and learning approaches, is inextricably linked to the diverse groups of students it encompasses. Each year, these students make enrolment choices as they negotiate their pathways of progression through the system.

Who are these students? Students commencing a university course are diverse. Varying in their characteristics, demographics and family backgrounds, these students, both full-time and part-time, also vary in their background schooling, school outcomes, their post-school preferences for courses at university, and the range of university courses available to them (Bornholt, Gientzotis, & Cooney, 2004a; Department of Employment, Education and Training, 1993; Parker et al., 1993). Once at university, students respond in varied ways to their university course and surroundings. It is assumed these diverse groups of students will themselves be subsequently changed, both academically and socially, by their university experiences. Following course entry, individual variation is evident in academic success, in student feelings of success or failure and in other emotional reactions to the university experience. Policies, demography, social structures and resources all have implications for the development and diversity of these students. Each student holds expectations concerning their course, as well as their obligations and commitment to it following initial enrolment (McInnis, James, & McNaught, 1995). In time, a student's expectations will have either been met or not met and their feelings about the surrounding university contexts and courses adjusted accordingly. If individuals perceive themselves as part of a community, in this case an

educational and social community, this may influence decisions pertinent to remaining or leaving that community (Bornholt, Piccolo, & O'Loughlin, 2004b; Osterman, 2000). There will be aspects of university life including course assessment and academic policies which may have negative effects on the performance of some students and have positive effects on the performance of others. Some students may not feel intimidated by academic challenges such as competition, or continuous assessment, and may gain positively from such challenges while other students may be adversely affected by similar circumstances. Some students may feel marginalised or ill at ease with life at university while others may feel relaxed and involved and generally satisfied with their experience. In essence, diverse groups of students enter university, travel via diverse pathways through their studies, changing in diverse ways as they interact with other students and their learning context.

University context. The university context is one of a number of social contexts students may experience at this time in their life. There is considerable variation and complexity among formal Australian university contexts, from the traditional sandstone to the rural university, the 'new' university, the university of technology and the distance on-line university (Marginson, 1997, 2004). Universities differ in the variety of informal social networks and sub-cultures available to students, the services provided for students, their responsiveness to student demands and needs, and to teaching and curriculum changes. The term 'university context', as used within this research, refers to the broader cultural experience provided by a university which is influenced by university policies, curriculum, course requirements, standards and assessments, the values and expertise of staff and the students themselves. The university is considered here as

a general cultural context, differentiated and distinct from the wider external community. It is seen as an integrated community that incorporates clusters of cultural groups that entail faculties and the more specific cultural contexts of courses.

Course context. The social and academic context of course environments vary both among universities and within each university (Andrews, Aungles, Baker, & Sarris, 1997; Department of Education, Science and Training, 2001; Department of Employment, Education and Training, 1996; Hativa & Marincovich, 1995; University of Sydney, 1994; Vreeland & Bidwell, 1966). The cultural context of a degree course is reflected in academic experiences, social mix, student support services, the events and activities of enrolment and completion, course expectations and in the obligations that are associated with course participation. Course admission criteria, policies for course selection, modes of teaching, the staff, forms of assessment, the curricula as well as the other enrolled students, all form part of the cultural context of a course.

The context of a course is also assumed to vary across the stages of a course. A new commencing student, whether following straight from school or not, is entering a new culture, and adapting to a new setting, a new course and social life. This experience is likely to be different to the experience of re-enrolling in subsequent years of a course, each stage having different expectations, choices, and student groups. Each student responds in their own way to their surroundings, being part of the social context of other students, part of the culture of their course and the university. Their responses become part of the changing context of the course itself.

An appropriate framework for explaining student progression and

performance outcomes needs to acknowledge the diversity of students and the differences in cultural contexts, as well as the educational choices of students as they move over time along a pathway through these cultural contexts.

Conceptual framework

A strong platform for developing an appropriate theoretical framework for investigating student progression and associated behaviour outcomes is provided by a socio-ecological perspective, in particular, the co-constructionist perspectives of Valsiner and Lawrence (Lawrence, Benedikt, & Valsiner, 1992; Valsiner & Lawrence, 1997). Focusing on the interdependent relationship between the individual and their social context, psychological development is viewed as culturally guided and personally constructed (Valsiner, 1999, 2000). Valsiner makes a distinction between the personal culture of the individual and the collective culture experienced by the individual. Personal culture is viewed as part of a process of actively organising and re-organising one's thoughts, values and beliefs in response to the surrounding constantly changing context. Information from the social world is internalised and transformed into a uniquely personal and subjective form (Lawrence & Valsiner, 1993). Development is theorised to take place over time through continuing interactions between an individual and their surrounding social-cultural contexts. Both the individual and their cultural context are theorised to undergo change. Development is assumed to occur continuously as individuals constantly construct and re-construct their response to a constantly changing collective culture. From this perspective, individuals determine their own pathway through life by moving both within and between various social cultural contexts (Valsiner & Lawrence, 1997). Social contexts are seen both to influence and to provide opportunities by defining appropriate roles and tasks

without categorically determining personal development. Valsiner's canalization conceptualises boundaries that present the individual with options of alternative potential branching paths representing further activities or roles within a social structure such as school. Personal development is viewed as potentially multi-directional both within and among such social structures. Individuals, supported by their immediate surroundings, decide on their own individual life path, by changing directions to take particular paths through various social contexts. In a reciprocal fashion, a change in a person's life path is assumed to lead to changes within the social structures or the wider cultural contexts.

Pathways approach to higher education

From this broad theoretical approach, the university can be seen to encompass a heterogeneous culture within which individual courses can be viewed as separate contexts. The student makes a choice of course influenced by personal characteristics, such as those related to schooling, socio-economic factors and past experience, and enters the culture of the university. The student commences their course, one of the many integrated social contexts to which they belong, and progresses by a series of educational choices negotiating a progression pathway over time. The course places constraints but also provides opportunities for the student. Assessment, evaluation and feedback on performance at university may also be seen to provide constraints requiring students to make choices on their future directions. Such choices may include re-enrolment in the same year or the next, transfer of enrolment to a different course, course completion, or course stop-out or withdrawal. After yearly assessments for example, a student may choose to change direction in their progression path. Over time, enrolment choices by students may take them out of their courses,

temporarily or permanently and into other contexts. The cultural context of courses and the wider cultural context of the university itself change over time partly in response to such student change, thereby altering the mix of students and experiences for the next year.

Continuities and differences between school and university backgrounds in terms of social factors, may affect personal experience at university. Social or family expectations may influence the development and the direction of students through their time at university. University experience is assumed to guide and influence the establishment of a personal system of values and ways of thinking and feeling. Over and above actual performance, personal interpretations of events may lead to a range of possible choice behaviours. For a variety of possible reasons, some students may be motivated to make changes in direction, changes such as withdrawal, stopping out or transferring to another course.

A socio-ecological system in balance....

From a socio-ecological perspective, a continuously interacting process between students and their learning context takes place. Constrained both explicitly in terms of course guidelines, teaching approaches, assessments and university regulations, and implicitly in terms of the pre-enrolment characteristics of the student such as background, school academic performance and their preference for the course of enrolment, students are assumed to make a series of educational choices determining their progression pathway. Within these parameters set by the personal characteristics of students and by contextual constraints, student responses provide a counterbalance to reciprocal contextual responses. Progression and performance outcomes of students, themselves influence and are influenced by changes in the course and the wider university

environment. This research focuses on indicators of such complex processes using longitudinal pathways over time to track student response and change. Using student record data, the research focuses on indicators of student behaviour outcomes in relation to the theoretical perspective. With an extension of the present data, reciprocal contextual responses and the underlying student's thoughts, feelings or reasons behind outcomes will form part of further research.

Without choice options for students, all pathways through university would be similar. If contexts were inconsequential to these choices, progression pathways would be similar both across and within courses. Patterns of enrolment choices would be expected to be similar regardless of context. The policies and practices of the university allow many possible pathways for students through their learning contexts. These possibilities allow yet do not ensure diverse pathways. It is clear that without this flexibility all pathways through university would be similar. The nature of the learning contexts allows progression pathways to vary both across and within courses. Similarly, if personal and social factors of students cannot be assumed to impact on choices differentially across courses, there would be no interaction between choices, context and personal characteristics. In such cases, diverse students would be making similar choices over time irrespective of context. If the relationship between student response and their studies were uni-directional, the consequence would be an unresponsive higher education system.

The cultural contexts and influences over time are presented in Figure 2.1. This diagram shows a student at the centre of several bi-directional influences that may change over time within the context of the university, the enrolled course and pre-enrolment home context. Each student is not only part of the context of their

course but also part of other cultural groups and perhaps course contexts within the wider university as well as their home situation. Each student responds to these multiple contexts which in turn are assumed to change over time in response.

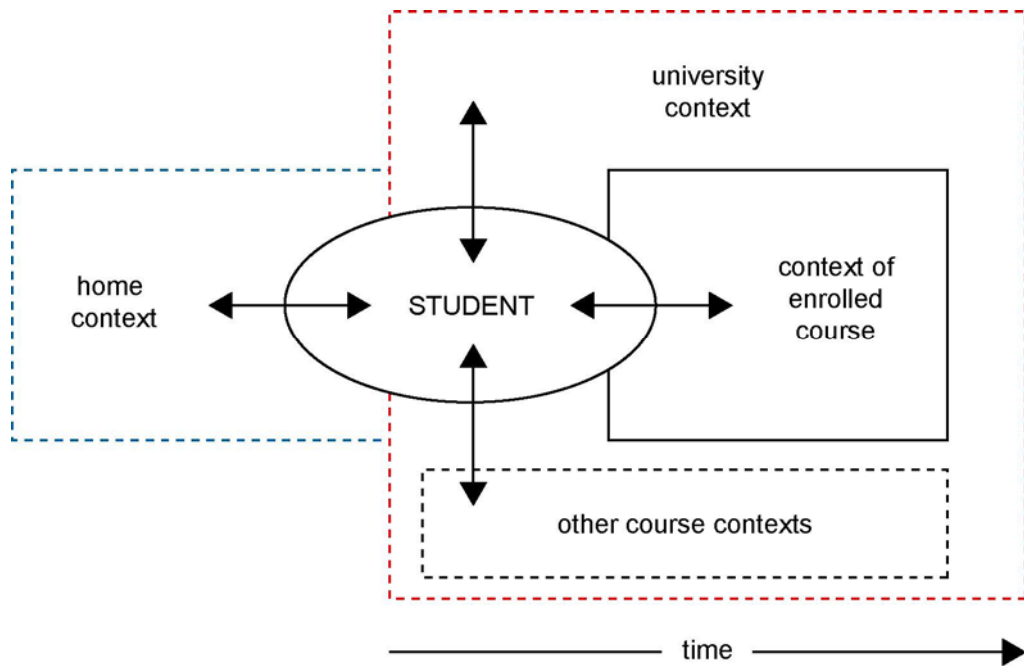


Figure 2.1. Conceptual diagram of a student over time within learning contexts at university. Direction of contextual influences indicated by \longleftrightarrow .

Pathways of progression through these contexts following course commencement are modelled in Figure 2.2. Figure 2.2 is colour-coded to show the variety of possible academic choices open to a student commencing, continuing and completing courses. Over time, students make pathway choices as they move through contexts, whether these are specific course contexts, the wider university context or contexts external to the university. At different stages, some choose to move out, some remain enrolled, while others leave but return later.

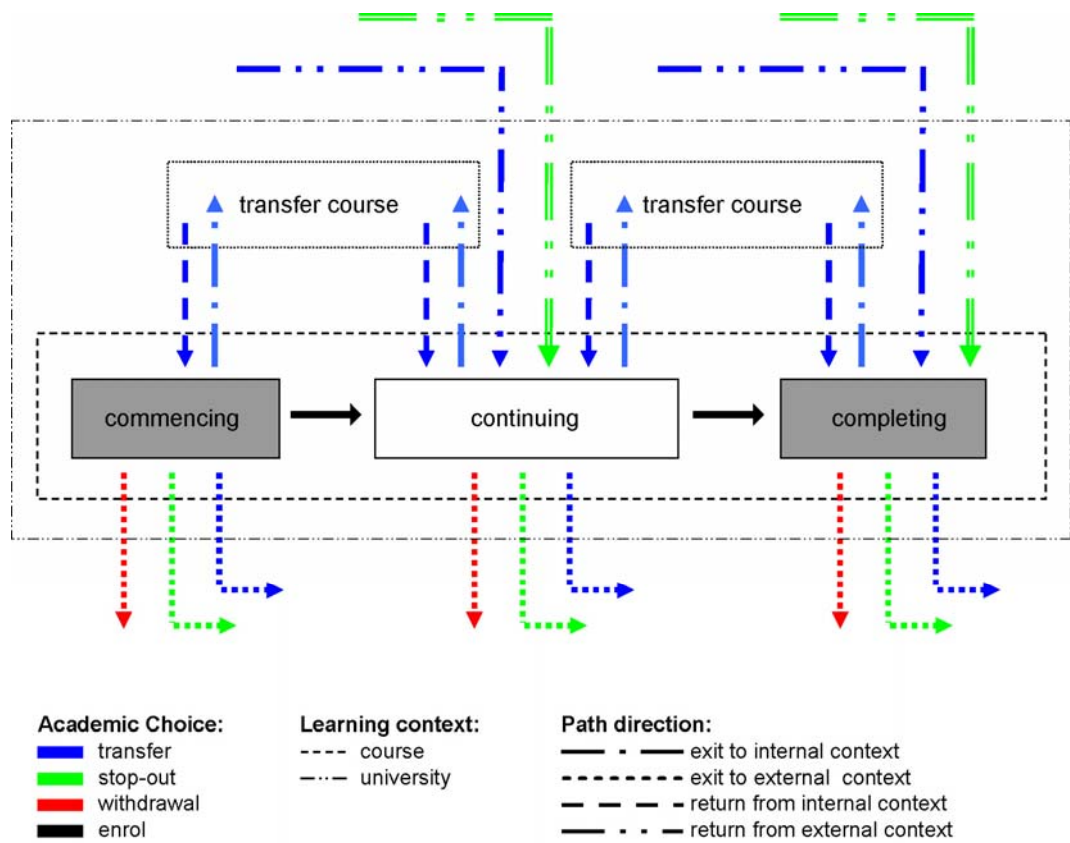
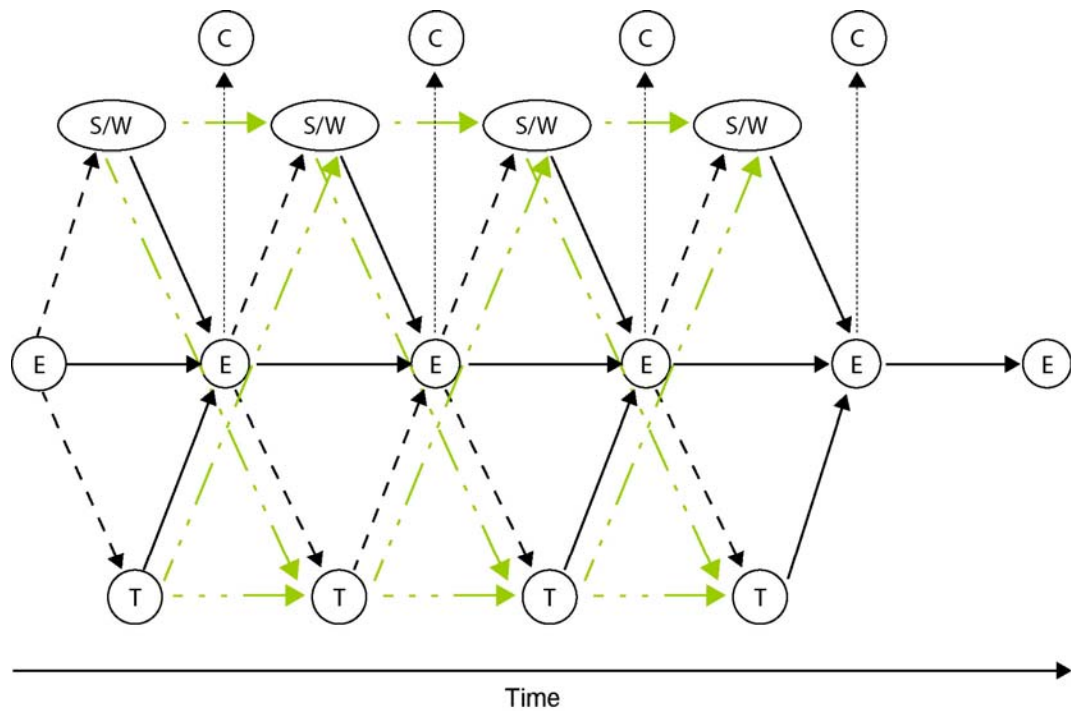


Figure 2.2. Student pathway choices through learning contexts over time

Figure 2.3 is a conceptual model of the enrolment choices that students have over time from the point of course entry. Each commencing student has the choice following each year to remain enrolled within the course context (E) or to leave the context by transfer (T), withdrawal (W) or a temporary stop-out (S). These choice options continue to be available over time unless the course is completed (C).



Path direction:

- remain within context or return to context
- - -→ leave context to transfer, stop-out or withdraw
-→ leave context on completion (C)
- - -→ remain outside the original context as result of transfer, stop-out or withdraw

Enrolment choices:

- E=enrol
- S/W=stop-out or withdraw
- T=transfer

Figure 2.3. Conceptual diagram of enrolment choices across time from course commencement

Figures 2.1-2.3 together illustrate the possible academic choices and learning contexts available to students as they create their own pathway of progression from course entry across time.

In essence, pathways through courses at university are conceptualised as a diverse series of choices in particular contexts. Personal and social characteristics of students are assumed to have impacts at various points along these progression pathways within a responsive higher education system.

CHAPTER 3

THEORETICAL APPROACHES TO ACADEMIC CHOICE

Theoretical perspectives

From a broad socio-ecological perspective, individual development is explained in terms of the choices an individual makes over time as each finds a pathway through surrounding social contexts, a pathway that satisfies their expectations and their needs (Lawrence & Valsiner, 2003; Valsiner & Lawrence, 1997). An individual becomes part of an ongoing reciprocal process of response and change between themselves and their surrounding contexts as they move through time. Their perspective and feelings of belonging within the surrounding social context are posited to play an important part in negotiating this pathway (Lawrence et al., 1992).

Explanations of choice behaviour in the context of higher education have not been viewed within this broad theoretical perspective. Progression through higher education has been viewed from a range of theoretical perspectives with varying emphases given to the importance of the individual, their social context and the interaction between both these in explaining progression.

Theoretical approaches to explaining progression and performance include a number of perspectives on explaining the academic choices students make. The theoretical perspectives include individual/psychological approaches (Astin, 1993), socialisation theory (Attinasi, 1989; Cabrera, Nora, & Castaneda, 1993; Pascarella & Terenzini, 1980; Spady, 1971; Tinto, 1993; Weidman, 1989), rational choice theory (Beekhoven, De Jong, & Van Hout, 2002, 2003; Need & De Jong, 2001), and others (DesJardins, Ahlburg, & McCall, 1999; Mann, 2001; Tierney & Rhoads, 1985). These have generally focused on explanations of

outcomes of progression, such as annual performance, completion, retention and withdrawal.

Academic and Social Integration Model

Up to the 1970s, no expressly stated theoretical framework was used by researchers to model aspects of progression in higher education. At this point, Tinto's influential model of academic and social integration within US institutions became popular (Tinto, 1975, 1986, 1993). This approach assumes retention to be a consequence of a student's integration, both academic and social, within an institution. Retention is modelled as part of a longitudinal process whereby shared cultural norms, values and support, together with satisfactory academic performance, are theorised to increase a student's academic and social integration within the academic community. This in turn is theorised to increase student satisfaction and positively influence commitment to college or university and hence graduation. Student background characteristics and academic potential are assumed to have a direct effect on this process. Interaction between a student, their attributes and background characteristics, and other students and staff within the institution is postulated to influence retention as students find a compatible context with shared values, norms and behaviour (Tinto, 1993). With a match between themselves and their institution, the student is assumed to feel part of the community and less likely to leave. Student adjustment to the normative culture of the institutional environment is foremost in this approach.

Extensions of the Integration Model ...

With elements similar to the earlier work of Spady (Spady, 1970, 1971), the Integration Model has been influential in the approaches of Bean, Cabrera, Pascarella, Terenzini and colleagues (Bean, 1980, 1982, 1983, 1985; Cabrera et al., 1993; Cabrera, Castaneda, Nora, & Hengstler, 1992; Pascarella & Chapman,

1983; Pascarella, Duby, & Iverson, 1983; Pascarella & Terenzini, 1980, 1991; Terenzini, Pascarella, Theophilides, & Lorang, 1985). Tinto's approach has been extended to explain student attrition as a reflection of the organisational characteristics of higher education institutions such as structure, resources and work organisation (Allen, 1999; Bean, 1982, 1983, 1985; Bean & Metzner, 1985). Interactions between organisational characteristics and the characteristics of students are theorised to impact on student satisfaction and ultimately on student retention. Perspectives of both Tinto and Bean have been incorporated into a combined approach by a number of researchers (Braxton & Brier, 1989; Cabrera et al., 1993; Cabrera et al., 1992).

Pascarella and Terenzini's approach to student learning, with a theoretical base in Tinto's social and academic integration model, has also been applied to student attrition (Nora, Cabrera, Hagedorn, & Pascarella, 1996; Pascarella et al., 1983; Pascarella & Terenzini, 1980; Terenzini et al., 1985). Pascarella's 1985 model places greater emphasis on the influence of an institution's structural and organisational characteristics than the model of Tinto (Pascarella & Terenzini, 1991). Characteristics such as institutional selection processes, size, residence arrangements, policies, student support and faculty culture, together with student background characteristics are assumed to shape the university environment. These factors, together with student effort and social interactions with other students, are assumed to shape and influence progress and retention. Individual characteristics are seen as possibly mediating the impact of the academic environment. The 'model of college impact' of Terenzini, Spring, Yaeger, Pascarella and Nora (1996) is influenced by Astin (1993), by Tinto (1993) and by Weidman (1989). Both this model and Pascarella's model of student learning

postulate a reciprocal causation between students and their college experiences and outcomes, but leave the details of course differences in retention and other performance outcomes unexplained.

Weidman (1989) provides a conceptual framework for understanding undergraduate socialisation. Interpersonal relationships and the characteristics of students as well as the organisational characteristics of the institution itself are linked in a multi-directional causal manner. Weidman assumes the socialisation process is longitudinal and bi-directional in influence between the student and the institution. Attrition is considered less likely if the student is successful both socially and academically. Background characteristics, demographics and aspirations together with normative pressures from parents, peers and community shape and constrain student socialisation. Students who cannot meet the group normative expectations or who feel disengaged from the group may move to a context which is more closely matched with their own values and aspirations. As in the theoretical perspectives of Tinto, Pascarella and Terenzini, balancing normative influences, both academic and social, is central to these approaches.

Limitations of current approaches

With focus on integration and acceptance of the normative values and behaviours of institutions in the theoretical perspectives of Tinto, Bean, Cabrera, Pascarella and Weidman and colleagues (Cabrera et al., 1993; Pascarella & Terenzini, 1980; Spady, 1970; Tinto, 1993; Weidman, 1989), variations in retention are seen as a result of variations in integration, that is, in accepting normative values and behaviours. Maintenance of the system is built upon student acceptance of the status quo rather than on change in response to the context.

Variation in retention rates and performance between courses within the same institution are not easily explained from Tinto's perspective. The wider

context of the institution is assumed to play a greater influential role in retention than the more specific learning contexts of courses (Tinto, 1996). Although Tinto acknowledges the importance of these sub-contexts, retention is posited to be dependent upon the number of these sub-cultures to which the student belongs and the extent to which each shapes the character of the broader institutional context (Tinto, 1993). Tinto assumes students face varying degrees of difficulty and changing patterns of interaction over time in attempting to remain in college. Although positing a bi-directional process of interaction between students and the wider context, Tinto's approach underrates the importance of the responsiveness of the learning context to student input and outcomes. Contextual change in terms of areas such as curriculum, assessment or policies in response to performance outcomes, are not acknowledged.

Tinto's model acknowledges that students are influenced by their experiences *after* course entry. However, the different academic choices that students are confronted with are not addressed. Pathway options such as decisions to transfer to another course, temporarily or permanently, or to stop-out and return later are not included in this model. Focusing on retention within the institution, the complexity of other pathway options confronting students annually is overlooked. The possibility that such diversity may be a positive outcome for some, enabling further choice to a more suitable program, is not considered.

These perspectives place the student within a wider more general academic and social context of the institution, rather than within more specific learning contexts. Differences in student responses and outcomes across the contexts of courses are not explained. With a focus on student retention or course withdrawal, other options such as the return to studies of many students following

a break are left unexplained. The changing patterns of options over time, the student's part in addressing these options, and contextual change in response to student change are unaddressed. On the whole, these perspectives view the student as maintaining an active role in a specific behaviour outcome within a general context.

There are several features of higher education systems that warrant an ecological approach to models of student progression. In considering context, new models are needed for each higher education system. Tinto's model and derivative models, such as those of Pascarella, Cabrera, Bean and colleagues (Bean, 1980, 1983; Cabrera et al., 1992; Pascarella & Chapman, 1983; Pascarella et al., 1983; Pascarella & Terenzini, 1980, 1991; Terenzini et al., 1985) are based on a system different to that in Australia. Although a number of policy influences come from the UK and the US, the system of higher education in Australia is different in many respects to other systems. Evidence of recent changes in a number of European university systems and in China (Welch, 2005) and in reports of work among OECD countries (Bijleveld, c1994; Brennan & Shah, 2000; Moortgat, 1996; Organisation for Economic Cooperation and Development, 1998) highlight differences. In particular, Australian universities have a diverse student intake comparatively wide in age range, ethnicity and socio-economic background and with increasing numbers of part-time students (Department of Education, Science and Training, 2000; Department of Employment, Education and Training, 1993).

A large proportion of Australian students commute each day to university. Attributing attrition in non-residential US colleges to the absence of the strong social systems found in residential colleges cannot be generalised to different systems. Only a relatively small proportion (~10%) of university students in

Australia change residential accommodation when moving to higher education (James & McInnis, 1997). The large majority consists generally of urban commuters with only a small proportion of students living on campus in residential college accommodation (Department of Employment, Education and Training, 1993, p. 207:15% in 1984). Apart from those students enrolled in distance education courses, it is likely that a large proportion of students visit university only to attend lectures. Greater involvement in the immediate learning context of a course and less in the wider university context is more likely, both academically and socially, in the context of an Australian university. A concept of integration therefore has less relevance to the largely non-residential Australian system.

Within the diverse and integrated context of Australian higher education institutions, it is also difficult to see how students with differing cultural backgrounds and values can become integrated into one dominant culture. A so-called dominant culture also assumes a similarity in cultural terms between the learning contexts of faculties and courses.

In Australia, institutional characteristics beyond the specific aspects of particular courses are not strong influences in the choice of university for tertiary applicants in Australia (James, Baldwin, & McInnis, 1999a). In the US, the initial commitment level of a student to the institution itself, as opposed to a course, may affect later retention. However, it would seem unlikely that Australian students would have a special bond with their university to the same degree as their American counterparts.

There are also important distinctions in the proportion of students entering university directly from school. In Australia, a significant proportion of

commencing undergraduate students do *not* come direct from school (Department of Education, Science and Training, 2001, 44% of local students in 2000).

Student perspectives of context

A shift in theoretical approach to include explanations of the thoughts behind the responses and the planned behaviour choices of students would provide a more appropriate theoretical background to explaining student choice and behaviour outcomes within context.

Theories of planned behaviour, including expectancy value models, consider students' perspectives on choices (Ajzen & Madden, 1986; Eagly & Chaiken, 1993; Wigfield & Eccles, 2000). In educational contexts in particular, these kinds of models include the thoughts and feelings of the student. For example, a student's thoughts as to their likelihood of success is seen from a rational action theoretical perspective to explain educational choices and consequently academic progress (Beekhoven et al., 2002; Need & De Jong, 2001). Beekhoven et al. combined Tinto's integration theory and rational choice theory into a longitudinal model to explain academic progress in higher education in The Netherlands. Key to this approach is the students' interpretation of surrounding events as they assess their likelihood of success. Student experiences, plus personal, social and financial factors, are theorised to affect their progress. This approach assumes student satisfaction influences their assessment of their likelihood of future success and their choice to remain or not within the course. Although the student is viewed as active in decision making, the learning context itself is not viewed as part of an interdependent process of mutually responsive change. In further research, using multilevel modelling across a number of courses, Beekhoven et al. (2003) noted a substantial variance at course level in behaviour outcomes. Beekhoven reports contextual differences after controlling

for individual factors although individual pathways were not mapped in and out of context.

Viewing the student as active in decision making also underlies the event history modelling approach of DesJardins et al. (1999) and DesJardins, Ahlburg and McCall (2002). Their approach assumes each student makes rational decisions in weighing up the costs and benefits of continuing or discontinuing at university. Although DesJardins et al. investigate the possibility of differential effects of explanatory variables over time, contextual effects have not been included in the model. It is a longitudinal empirical modelling approach, investigating the time-variant nature of variable effects and examining both the process and outcomes of student departure. This modelling approach makes a positive contribution to the field, although it does not explain the personal and social factors involved in these processes and outcomes.

Mann (2001) presents her theoretical explanation to understanding student learning in higher education in terms of the student's experience of engagement or alienation. She examines cultural constraints of groups within a context and the importance that power plays on individuals or groups. Mann's theoretical perspective of student progress is based on the assumptions underlying a critical theory perspective. It is a sociological explanation that brings in the important consideration of social advantage and disadvantage, but does not add to an understanding of *individual* student progress over time. It does not go far enough in explaining pathways and choices at the individual level. Similarly, the more sociological approach of Tierney and Rhoads (1985) looking at individuals within their social circumstances, does not present an approach which contributes to an understanding of individual progress.

Approaches to explaining student progression need to consider the thoughts and feelings of students as they contemplate their future path choices. An example in higher education is the work of Johnson (1994) and Johnson and Buck (1995) in Canada. With a model similar in some ways to Tinto's approach, Johnson investigates the consequences of integration for student performance but includes within his approach the psychological states of a student such as satisfaction or stress. These are seen to directly or indirectly affect withdrawal. However, this approach does not explain the effects of the immediate course context in explaining differences in path choices within the same institution.

Attinasi (1989, 1992) approaches student outcomes from the perspectives of students within their own cultural context. Attinasi assumes the decision to remain within the university is not only academic but one related to the manner in which the university remains socially relevant to the student. However, Attinasi has not presented a detailed alternative theoretical model at the individual level.

An important addition to the body of theory relating to student progression is the model of undergraduate non-completion of Ozga and Sukhnandan (1998; as cited in Yorke, 1999b). Modelled from higher education data in the UK, this approach acknowledges the importance of different contextual factors, and views non-completion as the end-point of a *process* of progression along differing pathways over time. Limited to undergraduate non-completion, this model begins to unravel the complex longitudinal process of student-contextual interaction. Characteristics such as student preparedness, course choice and compatibility with the institutional context are modelled as important factors for completion.

Although much past research has given insights into theory, a theoretical perspective is often not explicitly stated within the research. Many studies fit

comfortably within Tinto's integration model, Bean's student departure model or in the model of Cabrera and colleagues integrating these two approaches. Despite considerable research attention focused on progression outcomes, in particular on retention and attrition, there is little research on theoretical perspectives relevant to the longitudinal process of progression. Much of the research related to retention and completion is conducted within a limited time frame.

An appropriate theoretical perspective needs to accommodate cultural variations in systems of higher education. Such variations are evident from research across a number of countries (Finocchietti, 1995; Jallade, 1992; Moortgat, 1996) including The Netherlands (Beekhoven et al., 2002, 2003), Estonia (Ransdell, 2001), Sweden (Niit, 2001), Finland (Nurm & Aunola, 2001), Columbia (Ardila, 2001) and in the UK (Smith & Naylor, 2001b; Yorke, 1999a). In Australia in particular, a strong interest is evident from the numerous reports, both government and academic, on specific aspects of the higher education system (Abbott-Chapman, Hughes, & Wyld, 1992; Andrich & Mercer, 1997; Department of Education and Science/Australian Vice-Chancellors' Committee, 1971; Dobson et al., 1997; Dobson, Sharma, & Haydon, 1998; Lewis, 1994; Linke, 1992; Linke et al., 1991a, 1991b; Martin, Maclachlan, & Karmel, 2001; McClelland & Kruger, 1993; Power, Robertson, & Baker, 1987; Sadler, Cohen, & Kockesen, 1997; Urban et al., 1999; West, Hore, Bennie, Browne, & Kermond, 1986). Despite the variety of studies, theoretical emphases and cultural variation within different national contexts, little has been added to the general body of theory. It is argued that a viable theoretical approach is needed that is specifically relevant to the Australian system.

An appropriate theoretical perspective on student progression would

acknowledge the *diversity* of today's student population as well as *change* and *responsiveness* of both student and their learning context over a substantial period of *time*. It is proposed that an appropriate approach to student progression is one which incorporates a longitudinal perspective on the academic choices students make as they negotiate a pathway through the multiplicity of learning contexts within a larger university context. The impact of the personal characteristics of students at points along this sequence of pathway choices, also needs to be considered. A broad socio-ecological approach provides a backdrop for a new theoretical perspective in the investigation of student behaviour outcomes within higher education.

CHAPTER 4

STUDENT PROGRESSION: A REVIEW OF RESEARCH

This review of empirical research relating to student progression focuses on the academic choices students make over their time in higher education, the related learning contexts, and in particular, those student characteristics and demographics associated with these pathway choices and behaviour outcomes.

Pathways as academic choices over time

Comparatively little research has approached student progression longitudinally through higher education. Investigating the series of academic choices each student makes over time as they make their way through undergraduate courses requires a longitudinal approach at the individual student level. Data documenting these choices as a longitudinal progression needs to be in a form which facilitates statistical analysis at the student level rather than aggregate data at the course or institutional level. Past research tends to focus on the specific outcomes of the process of progression, outcomes such as retention, attrition, performance or completion at specific stages. Much past research is limited to a short-time period and often reports outcomes in terms of cross-sectional, aggregate data (Johnes, 1990; Johnes & Taylor, 1989). Successive collections of such data have often incorrectly been referred to as 'longitudinal'. The critical importance of a longitudinal approach compared to cross-sectional assessments, is noted by a number of researchers (Astin, 1993; Astin & Lee, 2003; Pascarella & Terenzini, 1991). However problems in tracking individual students have often made it difficult to obtain reliable long-term data. Few published studies follow the same cohort of students for more than two years. Much of the research has been concerned with either performance in first year university or

first year to second year enrolment (Baumgart & Johnstone, 1977; Cabrera et al., 1993; McClelland & Kruger, 1993; McInnis et al., 1995; McKinnon, Walker, & Davis, 2000; Pascarella et al., 1983; Pascarella, Terenzini, & Wolfe, 1986; Price, Harte, & Cole, 1992; Stage, 1998; Yorke, 2000c). Government research generally focuses on single year-to-year enrolment (Department of Education, Science and Training, 2001; Linke et al., 1991a; McKinnon et al., 2000). Other studies have examined first year and graduation year cohorts. Only a few longitudinal studies cover a period of time substantially beyond the nominal length of a course (Abbott-Chapman et al., 1992; Martin et al., 2001; Powney & Hall, 1998; Urban et al., 1999; Yorke, 2000a).

Students who choose to transfer to other courses or institutions are sometimes acknowledged (Higher Education Funding Council for England, 2003), sometimes included in the overall retention rate (Andrews et al., 1997), but rarely included as a separate category (Astin, 1971; Glossop, 2002; Munro, 1981; Pascarella et al., 1983; Price et al., 1992; West, 1988). Although such students are comparatively small in number, little is reported on their performance or progress. In Australia, students are selected to specific courses within a university (rather than selected to universities), so transfer or change of course is an important issue within Australian higher education.

It has been difficult in some situations to determine the completion status of some students given the flexibility of systems which provide for the movement of students from one course to another, out of the system and back in again. Monitoring student completion rates has encountered difficulties across systems of higher education in defining completion rates, in finding an acceptable time-frame and in dealing with students who transfer (Bardsley, 1991; Bijleveld,

c1994). A small number of studies have attempted to document the pathways of those students who return to studies following withdrawal or transfer but who finally complete their courses (Martin et al., 2001; O'Toole, Stratton, & Wetzel, 2003; Urban et al., 1999). Although the study of Urban et al. addresses completion with a detailed longitudinal approach, the study does not go far enough. A distinction has not been made between completion of those courses commenced at the start of the study and completion of other courses. Student information involving course transfers and second degrees was not included. The resultant issue of double counting of some students was addressed in the subsequent update of Martin et al. (2001). However, amongst students commencing with incomplete awards, who are excluded by Martin et al., there are also likely to be a number of students who transferred back to complete their original course (for example, the double degrees). Neither of these studies presents all pathway choices. Some studies have focused on the estimation of course completion rates (Shah & Burke, 1999) or the probability that a student will withdraw before completion (Smith & Naylor, 2001b). Smith and Naylor (2001b) analyse UK population data at the individual level. However the detail of individual progression through a course is lost using separate binomial probit regression analyses to determine the probability of withdrawal during any year of study. Data on withdrawing students who subsequently return to studies was not available. The length of time taken to reach graduation or completion represents another approach (Department of Education and Science/Australian Vice-Chancellors' Committee, 1971; Holder, Jones, Robinson, & Krass, 1999; Volkwein & Lorang, 1996). These studies all focus on the end product of progression rather than on sequences of behaviour outcomes involving the

pathway choices in the process of reaching completion.

Of the few genuine longitudinal studies, most are based upon full-time students who have recently left school. Ignoring part-time students, the frequency of their enrolment changes and the diversity in the timing of these decisions may distort research outcomes. Yet, focusing on the retention of part-time students over short periods of time may underestimate long term retention and the frequency of stop-out and return among this group (Bean & Metzner, 1985; Metzner & Bean, 1987; Tinto, 1982, 1988, 1993). This point is illustrated in an extended five year longitudinal study by O'Toole et al.(2003). In their sample of part-time students, 30% stopped out at some stage but 40-60% of them eventually graduated compared to 60% among the full-time students.

There are difficulties and inconsistencies in the clarity of definitions of various performance outcomes in the process of progression. Although the term *attrition* generally implies leaving at some stage before completion or graduation, and *retention* implies the reverse, there is no authoritative definition of these terms. Decisions to leave a course may be the consequence of academic failure, course-related work experience, a temporary transfer to a related course, or a number of other external or personal reasons. The term *retention* is sometimes used synonymously with the term persistence, particularly in the US (Allen, 1999; Munro, 1981; O'Toole et al., 2003; Pascarella, 1982; Tinto, 1998) and *attrition* is variously referred to as dropout, withdrawal, stop-out and wastage. Bean (1985) used 'dropout syndrome' to indicate the *intention* to leave. Although some researchers group those who fail and those who have chosen to leave under the term 'withdrawal' (Yorke, 2000a), others make a methodological distinction but focus on those who leave voluntarily (Johnson, 1994; Johnson & Buck, 1995;

Pascarella et al., 1983; Spady, 1971; Terenzini & Pascarella, 1977; Terenzini & Pascarella, 1978; West, 1988). Some researchers make distinctions between retention within the institution itself and within the higher education system (Munro, 1981; Price et al., 1992; West, 1988). In addition, a distinction is sometimes made in institutional data records between 'graduation' and 'completion' (Department of Education, Training and Youth Affairs, 1999b). However, the two terms have also been used synonymously (Department of Education and Science/Australian Vice-Chancellors' Committee, 1971; Lenning, 1982).

Terms such as student performance, academic achievement, success and failure, and progress have been used to some extent synonymously to represent student performance outcomes in higher education. The bulk of research into student progression has been concerned with the prediction of performance. The indicators of performance used in higher education research also vary. These include grade point average (Allen, 1999; Ardila, 2001; Dobson & Sharma, 1995; Hong, 1984; Marques & Miranda, 1996; Munro, 1981; West et al., 1986), semester weighted average (Burgum, Martins, & Northey, 1993), pass at least 75% of attempted credit points (Lewis, 1994; McClelland & Kruger, 1993), annual pass (Department of Education and Science/Australian Vice-Chancellors' Committee, 1971; Everett & Robins, 1991; Keef, 1992), annual subject marks (Evans & Farley, 1998), degree classification (Chapman, 1996a; Hoskins, Newstead, & Dennis, 1997; Richardson, 1995; Rodgers & Ghosh, 2001) and weighted progression index (McClelland & Kruger, 1993). Over the last decade, the Student Progress Unit (SPU-the ratio of assessed load successfully completed to the total assessed load) and Student Progress Rate have been routinely used as

indicators of student outcome performance by universities and by governments in Australia (Department of Education, Employment, Training and Youth Affairs, 1998; Department of Education, Training and Youth Affairs, 1998a, 1999a; Department of Employment, Education and Training, 1996; Dobson & Sharma, 1993; Dobson et al., 1997, 1998; Gallagher & Conn, 1994; Linke et al., 1991a; McKinnon et al., 2000; Power et al., 1987; Ramsay, Tranter, Charlton, & Summer, 1998). Such indicators of performance outcomes have generally been used as estimations based on either cohort-based statistics or cross-sectional census-like counts using information assessed at a single stage in course progression (Dobson et al., 1997; Linke et al., 1991a; McKinnon et al., 2000). Such cross-sectional and census-like approaches to indicators of performance are commonly used at the institutional level by governments, universities as well as in smaller scale studies (Chapman, 1996a; Department of Education, Training and Youth Affairs, 1998a; Dobson & Sharma, 1993, 1995; Dobson, Sharma, & Haydon, 1996; Dobson et al., 1997, 1998; Higher Education Funding Council for England, 2003; Linke et al., 1991a; Organisation for Economic Cooperation and Development, 1998; Price et al., 1992). The variety of terms and constructs used to indicate outcomes of progression, outcomes such as retention, attrition, dropout, withdrawal, stop-out, transfer and completion, present problems and inconsistencies in the interpretation and generalisation of research outcomes.

Despite this considerable attention over the last decade in developing various outcome indicators of student performance, retention and completion in higher education, indicators of individual progression have been neglected. Only through tracking individual students longitudinally over a wide time-frame, can an accurate picture of annual enrolment, individual progress and performance be

obtained. Acknowledging all on-going enrolment choices that students make as they proceed along a pathway through higher education is fundamental to understanding the process of progression. A longitudinal approach can indicate information on important aspects of course performance such as transfers to or from a course within or between institutions, the timing of failures and repeating of subjects, stop-out and withdrawal. Including all types of pathway outcomes reduces confusion with terms and definitions and enables a broader scope for further analysis. There is a need in longitudinal research for a convenient means for recording annual individual patterns of student progression.

To address this problem, a new technique has been developed for this project to record longitudinal enrolment and completions data at the student level (Robinson, 2004). Progression information in the form of a single *pathway* variable enables longitudinal studies on student progression to record as a single variable the entire sequence of yearly progression from initial enrolment to final completion or exit from the course or institution. This technique records all enrolment options - enrolment and re-enrolment, temporary stop-out, transfer and withdrawal as well as returns to study following any of these options. The pathways indicator of sequential choice (PISC) is a method of recording individual pathways of progression. Sensitive to the immediate learning context of a course, PISC provides a means for investigating the range of factors associated with the academic choices students make over time from the point of course entry. PISC provides a means for addressing some of the current shortcomings of research in this area.

Considering context...

Learning contexts in higher education are complex and distinguished by academic aspects such as staff and student profiles, courses, assessments and the

constraints imposed by factors such as these upon students. The learning context has a quality beyond the characteristics of its students, although the characteristics of those within a learning context contribute to the distinctive character of the context itself. Research concerning progression within higher education has been undertaken within the general learning context of an institution as well as the more specific and immediate learning context of subject or course. Much of the research lies at the general institutional level (Baumgart & Johnstone, 1977; Bean, 1980; Department of Education, Science and Training, 2001; Harvey-Beavis & Robinson, 2000; Munro, 1981; Pascarella & Chapman, 1983; Pascarella & Terenzini, 1979, 1980; Pike, Kuh, & Gonyea, 2003; Terenzini & Pascarella, 1977; Terenzini & Pascarella, 1978; Toutkoushian & Smart, 2001). Despite this, little is known about the relative influence of institutional context on outcomes of retention (see Titus, 2004). The present project is concerned with investigating progression outcomes at the individual student level within a single institution.

Research studies investigating student behaviour across courses are rare. Beekhoven et al. (2003), using a multilevel approach reflecting the hierarchical structure of the data, investigated differences in progress across different courses in The Netherlands. Substantial variance at the course level supports the importance of contextual differences in student performance, and reinforces the need to extend this research beyond the first year of courses. Van den Berg and Hofman (2005) used a three-level, multi-disciplinary approach to investigate the economic, social, psychological and organisational factors influencing study progress. This study found 95% of the total variance was due to student factors, while 5% was attributable to course factors. A Canadian study by Johnson (1996) found reasons for withdrawal were different across courses and pointed to the

importance of the character and quality of the learning place. Chapman (1996b) using aggregate data, reports an association between entry qualifications and degree results in the UK for eight academic subjects over a 21-year period. The strength of the relationship varied between subjects.

A number of studies investigated differences across combinations of courses through the use of terms such as discipline and field of study. Shah and Burke (1999) investigated the movement of undergraduates through the higher education system in Australia and found that the probability of completing and the time to complete an undergraduate course are likely to vary not only by age and gender of the student, but also by the broader field of study. Field of study is an indicator of potential occupation rather than course context. Discipline refers more to the course content than the social context of a specific course. A number of studies found students were more likely to complete their courses in arts and social sciences and less likely to complete in science and maths (Dobson & Sharma, 1993; McGivney, 1996; Ozga & Sukhnandan, 1998). Both studies by Everett and Robins (1991) and Power et al. (1987) found a stronger relationship between school performance and first year performance for science-related courses than for arts, education and nursing courses. Urban et al. (1999) also found that course completion varied across fields of study and suggested vocation specific courses had the highest completion rates. Price et al. (1992) suggested that attrition rates vary across faculties. These studies, combining the more immediate contexts of courses into fields of study or disciplines, suggest differences in outcomes across these broader areas. However, at the student level, changes in responses to the immediate course contexts are hidden and outcomes across specific courses have been aggregated. Consequently, details of

progression and progression choice are not available.

Much of the research involving the learning context of a course or a number of courses, disciplines or faculties, focuses on the relationship between a single outcome of performance, retention or completion and the characteristics of students. Although research touches on possible differences across contexts in specific behaviour outcomes, the enrolment choices that students make over time as they move in and out of learning contexts together with the effects on students of changing contexts over time, have been overlooked. A more comprehensive picture of progression would include student contextual choices over time and the changing profiles of student groups making these contextual choices within their learning contexts.

Student background characteristics and demographics

The choices that students make over time are assumed from a socio-ecological perspective, to be a function both of their own personal background characteristics and the social contexts of their course. With both individuals and their course contexts changing over time, personal background characteristics are assumed to hold varying levels of importance at different stages of course enrolment.

Students commencing university vary in their background characteristics and demographics. Research presents a mixed picture of the significance of various social and educational characteristics associated with progression through university. Associations between indicators of student behaviour outcomes and the background characteristics and demographics of the student, have added little in any consistent way to our understanding of the progression pathways students have chosen to take through university. Research has been undertaken within a

variety of courses, disciplines and fields of study and only recent research has used longitudinal data. Inconsistency in the use of terms and descriptions of constructs relating to behaviour outcomes such as retention, attrition, withdrawal, stop-out, transfer and completion, together with differences in the operational measurement of these, present problems and inconsistencies in the interpretation of such research outcomes. Variety in methodological and statistical approaches to investigating the place of background characteristics has in many cases rendered comparisons of research outcomes inconclusive. Only a small number of studies use longitudinal data at the individual student level to enable conclusions to be drawn regarding aspects of progression across multilevel contexts. None focuses on the movement of students in and out of their original course context over time. None examines the interaction of background characteristics and the changing pathways through these contexts.

Aspirations

A variety of terms, such as expectations, intentions, course preferences, aspirations, goal commitment and course choice, have been used to denote students' desires, hopes and wishes for their future studies. Application for entrance to university in Australia requires a prospective student to rank their preferences for future courses. A student enrolling in their preferred course is likely to experience initially a greater sense of satisfaction and enthusiasm at the commencement of study than a student enrolling in a course that is not their first preference. McInnis et al. (1995) suggested that a high proportion of school leavers were dissatisfied with university at the end of first-year and hoped to change their course enrolment. Amongst the satisfied group of students, a high percentage of students were enrolled in the course of their first preference. Dissatisfied students received lower grades than expected. Sharma and Burgess

(1994) suggested enrolment in the ‘wrong’ course was associated with leaving the institution prior to the completion of the program. Course preference was an important factor in early withdrawal from a course. A number of other studies also suggest inappropriate course choice, pre-enrolment expectations and aspirations are associated with withdrawal and non-completion (Abbott-Chapman et al., 1992; Attinasi, 1989; Department of Education, Training and Youth Affairs, 1999d; Dobson & Sharma, 1993; Evans & Farley, 1998; McGivney, 1996; Munro, 1981; Ozga & Sukhnandan, 1998; Peel, Powell, & Treacey, 2004; Power et al., 1987; Ramsay, Tranter, Sumner, & Barrett, 1996; Schedvin, 1985; Yorke, 1998a, 1999b). ‘Institutional commitment’ and ‘goal commitment’ are terms common in retention studies in the US, in particular, research from the theoretical perspective of Tinto (Baird, 1988; Braxton, Sullivan, & Johnson, 1997). These terms however emphasise long-term institutional goals, whereas those terms more commonly used within research in the UK and Australia, terms such as ‘course preference’ and ‘course choice’, imply preference and choice relating to course entry rather than to long-term outcomes.

Research suggests that student aspirations evident from stated preferences for courses and course choice prior to course entry, are important factors associated with later outcomes of retention and attrition. The extent to which this association may vary across courses and the extent to which this association may change over time however, are not so evident from research.

Ability factors

School Achievement Assuming a student's previous educational experience contributes to subsequent learning experiences, previous school achievement can be assumed to influence performance at university. Predicting success at university from academic achievement in the final school year has been

the focus of much research in higher education. In Australia, in order to rank students for entrance to university, it is common to use a composite score as an indicator of high school achievement (Tertiary Entrance Rank-TER or the Universities Admissions Index-UAI). The research focus has been largely on selection criteria for entry to university, prediction of first-year performance or on course completion.

A number of studies suggest school achievement is linked overall to performance or completion at university (Abbott-Chapman et al., 1992; Chapman, 1996a; Department of Education, Training and Youth Affairs, 1999d; Kevern, Ricketts, & Webb, 1999; Lewis, 1994; Marques & Miranda, 1996; Richardson, 1995; Urban et al., 1999; West et al., 1986). Other research, undertaken within a specific context or with context as an independent variable, suggests school achievement is related to outcomes of annual performance or completion differentially across either courses, disciplines or fields of study (Burgum et al., 1993; Dobson & Sharma, 1993; Dobson et al., 1996; Evans & Farley, 1998; Everett & Robins, 1991; Holder et al., 1999; Hoskins et al., 1997; McClelland & Kruger, 1993; Power, 1990; West et al., 1986). A number of studies suggest school achievement is a stronger predictor of university performance in science-related courses than in the more humanities-based courses (Everett & Robins, 1991; Lewis, 1994; Power et al., 1987).

In contrast, an earlier report of Williams (1988, p.56) noted the withdrawal in first year of many Engineering students whose school records had indicated 'a capacity to complete their course'. However, at an Australian university, 'special entry' students with low tertiary entrance scores had in general a high success rate (Department of Education, Training and Youth Affairs, 1999a). Hoskins et al.

(1997) found that mature age students with non-traditional qualifications tended to have a higher final degree classification than students with traditional qualifications. The discipline in which the student enrolled appeared to be an intervening factor.

Conflicting research outcomes may be a consequence partly of methodological differences across studies, differences in measures of school achievement (for example TER, GPA and QTAC), in the analytical methods used or in the indicators of university performance (for example SPU, degree classification, completion, weighted progression index). The contexts of research varied from the wider university context to the narrower field of study and discipline to the more immediate learning context of the course itself. With such variability, inconsistencies across outcomes are not unexpected. Overall, the results of past research suggest prior educational achievement, either school achievement or prior post-secondary qualifications, may be associated with success in first year at university, success that could to some extent be discipline or course specific. However, it is unknown how far these effects feed forward through specific course contexts as students progress over time.

School English level and academic literacy skills Recent research suggests the academic literacy skills of commencing undergraduate students may be important factors in university success. Different disciplines possibly make different literacy demands upon students in terms of their curriculum and assessment. Courses with an arts/humanities content could be assumed to make different demands to those courses with a predominately mathematics or science component. However, there are some science-based courses which have communication components which may be challenging for students with low

academic literacy skills (Holder et al., 1999).

Evidence suggests that some high school subject combinations prepare students more effectively for university than others. Depending on their English level at school, school leavers differ in their experiences in essay writing and other literacy tasks. In a recent Australian study, Pharmacy students who had taken lower English classes at school had poorer academic literacy skills at university than those who did not (Jones, Holder, & Robinson, 2000). As expected, students who took higher English courses had better academic literacy skills. Although these results appear initially unsurprising, results of a study of relationships between academic literacy skills and the progress of enrolling cohorts of Pharmacy students showed that almost half enrolling students were lacking adequate English language resources necessary for tertiary study (Holder et al., 1999). It was interesting to note the lack of significant correlation between these students' literacy skills and their overall high school achievement. Measures on three separate literacy criteria were better predictors of university success than high school achievement alone. The level of academic literacy assessed in the early stages of a first year Pharmacy course was found to be important for successful course completion.

The extent to which student communication skills, whether written or oral, is a factor in academic progression can be assumed to relate to the extent to which coursework and assessment incorporates these skills. In their study of school leavers making the transition to tertiary study, McInnis and James (Department of Education, Training and Youth Affairs, 1999d) noted that many of the dissatisfied first-year students had difficulty during the year comprehending the material they had been asked to read. Evans and Farley (1998) showed a positive relationship

between school English level and performance in a business-related course on a campus with more non-school leavers and higher levels of part-time students, than at a traditional campus.

These studies imply that associations between school English levels, academic literacy skills, and aspects of pathways of progression, need further research.

Social factors

Home language background Community languages, that is, languages other than English, spoken at home are commonly used to indicate crucial factors in education. Students speaking community languages at home are likely to be recent migrants or children of migrants (Australian Bureau of Statistics, 2001). Speaking English as the main language at home has been linked in Australian research to more successful university performance. Evans and Peel (Department of Education, Training and Youth Affairs, 1999d) suggested that English language spoken at home gives a social advantage linked with higher academic performance in a first year business-related course. Using 1990 institutional data, Dobson and Sharma (1993) also suggest students who spoke English at home have a higher rate of success. Power et al.(1987) found men from non-English speaking backgrounds were more at risk of attrition in their first year than those from an English speaking home background.

Yet the findings are not consistent. Baumgart and Johnstone (1977) found that speaking a community language at home was a factor in the prediction of success in a first year Nursing course. Ramsay et al.(1998), in their study of the first year outcomes at an Australian university, found students speaking community languages at home, while experiencing lower success rates, were more highly motivated as evident from their lower attrition rates. This outcome was

supported by a study across all Australian universities in the same year, indicating that students who spoke community languages at home performed at least as well as other students (Department of Education, Training and Youth Affairs, 1999a).

A link between speaking community languages at home and lower attrition rates is supported by evidence from research into completion and graduation rates. Lower attrition rates are evident in the completion study of Urban et al. (1999). Overall, students who spoke community languages at home had completion rates significantly higher than those from English speaking backgrounds. Shah and Burke (1999) also found that students who spoke community languages had higher completion rates. However Long, Carpenter and Hayden (1995) in a review of Australian studies, found no evidence to suggest differences in graduation rates between students who spoke community languages at home and English speaking students.

An examination at the student level of the relationship between home language background, specific learning contexts and the pathway choices over time may shed light on these conflicting research outcomes.

Age and school leaver status The relationship between student age and behaviour outcomes such as first year academic performance, course discontinuation, retention and completion, has been the focus of a substantial number of research studies.

Mature age students have been a particular focus of research in relation to behaviour outcomes. However in terms of age, results have been inconsistent. Outcomes such as course withdrawal, lack of success and non-completion, appear to increase among older students in a number of studies (Johnson, 1994; Johnson & Buck, 1995; Murtaugh, Burns, & Schuster, 1999; Scott, Burns, & Cooney,

1996; Shah & Burke, 1999; Smith & Naylor, 2001b), although younger ages are associated with higher rates of course completion (Smith & Naylor, 2001a; Urban et al., 1999). However, studies point to the confounding effects of variables such as gender, prior qualifications, and different discipline areas or fields of study (Hoskins et al., 1997; Ozga & Sukhnandan, 1997, 1998; Price et al., 1992; Scott et al., 1996; Shah & Burke, 1999; Urban et al., 1999). Other studies suggest that mature age students perform at least as well as other students in specific disciplines (Dobson & Sharma, 1993; Houltram, 1996; Lewis, 1994; McClelland & Kruger, 1993).

Student groupings based on school leaver status (recent or non-recent school leaver) often closely follow age groupings. Assuming past learning experiences affect future performance, it can also be assumed that school leavers and non-recent school leavers may make different pathway choices in their progression. Student school leavers and non-recent school leavers may have differences in education level, prior qualifications, socio-economic characteristics and responsibilities pertinent to differences in progression. A study of adjustment and transition suggests school leavers are markedly different in their attitudes and experiences to non-recent school leavers entering their first-year (Department of Education, Training and Youth Affairs, 1999d; Lewis, 1994). Differences in outcomes for different age groups suggest school leavers and older students may withdraw from their courses for different reasons. For older students the pressure of employment, family or other external responsibilities is more likely to be related to course discontinuation than failure to cope academically. In a longitudinal study concerning the experiences of mature age students, Powney and Hall (1998) found financial and family responsibilities often detracted from

students' studies. Other studies supported these findings and found however school leavers discontinue through lack of preparation or poor course choice (Ozga & Sukhnandan, 1997, 1998; Yorke, 1998a).

Overall, research outcomes suggest the relationship of age to progression and performance of students may be confounded by a number of other variables such as gender, prior qualifications and the context of the research. Some studies have been undertaken within a particular course, some within wider disciplines or fields of study, and others at the institutional level. The different educational contexts of research may have contributed to conflicting results. The effects of such intervening factors may be different for older and for younger school leavers. Although a few of the studies have been undertaken at the individual student level, none has investigated the effects of age longitudinally within course contexts. Overall evidence is inconclusive on the relationship of age to progression and related performance outcomes.

Gender A number of research studies suggest gender is a contributing factor in performance at university, with women out-performing men (Department of Education, Training and Youth Affairs, 1999d; Dobson & Sharma, 1993, 1995; Dobson et al., 1997; Everett & Robins, 1991; Keef, 1992; McClelland & Kruger, 1993; Ozga & Sukhnandan, 1997; Power et al., 1987; Ramsay et al., 1996; Smith & Naylor, 2001a; Urban et al., 1999; Van den Berg & Hofman, 2005). While Smith and Naylor (2001b) found student withdrawal behaviour was very different by gender within institutions, direct comparisons within courses are not reported. Both Dobson (Department of Education, Training and Youth Affairs, 1999d) and Shah and Burke (1999) report gender, enrolment type and field of study among the key characteristics relating to progress. Shah and Burke found, in general,

women had a higher chance of completing a course and took a shorter time to completion. With superior performance of women in first year, Lewis (1994) found the gap increased in subsequent years.

The importance of gender *balance* within courses, as an intervening factor in performance or progression, is suggested in a number of studies. Performance and retention rates have been found to be higher for women, except where women are in a minority in a course (Beekhoven et al., 2003; Dobson & Sharma, 1993; McGivney, 1996; Ozga & Sukhnandan, 1997, 1998; Ramsay et al., 1998). With women dominating areas of arts, education, social sciences and health sciences and men dominating areas of mathematics, science and engineering, studies point to the possible significance of gender balance of the context for behaviour outcomes. Although much research is not course-specific but aggregate institutional data within fields of study rather than courses, research suggests gender and possible interactions with the gender balance of the context as possible factors associated with student outcomes. Little work has been done on gendered contexts in higher education.

Attendance type Part-time students tend to be older, possibly working full-time and are more likely to be women. With this in mind, it is possible that progression and behaviour outcomes will differ between full-time and part-time students. The time taken to complete a course is obviously related to attendance type with part-time students taking longer to complete. There are differences in attendance type across faculties, courses and fields of study with fewer part-time enrolments in courses such as engineering, medicine or veterinary science (University of Sydney, 2002). Research outcomes suggest attendance type, full-time or part-time, is an important factor in progression. Performance outcomes

may be compounded by the course of study and the balance of full- and part-time students. Price et al. (1992) found part-time students, particularly those enrolled in Arts, are at a higher risk in terms of attrition during their first-year. Reasons for withdrawal and non-completion among part-time students have been explored by a number of researchers (McGivney, 1996; Scott et al., 1996; Yorke, 2000c). Yorke found these reasons differed across subject areas. As part-time students generally have other commitments and less time for study, it can be assumed attendance type will be a significant factor in progression. Full-time students performed better than part-time students in a number of other studies (Dobson & Sharma, 1993; Shah & Burke, 1999; Urban et al., 1999). As O'Toole et al. (2003) suggest, part-time students with other commitments may take time out from studies more often than full-time students. A longitudinal approach over a substantial time-frame would capture the return and subsequent performance of such students. Course differences in attendance type highlight the importance of including learning context in the research paradigm.

Socio-economic background Socio-economic inequalities continue to influence access to higher education in many OECD countries (Organisation for Economic Cooperation and Development, 1988, 1998). Under-representation of students from socio-economic disadvantaged backgrounds within higher education has been a concern to a number of governments over recent decades (Department of Education, Training and Youth Affairs, 1999a; Department of Employment, Education and Training, 1990; Halsey, 1993; Herman, 1995). Some research suggests a strong association between socio-economic factors and aspirations for university education (Burnhill, Garner, & McPherson, 1990; Harvey-Beavis & Robinson, 2000), choice of university (James et al., 1999a),

later performance (Dobson et al., 1997; McClelland & Kruger, 1993), retention (Allen, 1999; Cabrera, Stampen, & Hansen, 1990; Pascarella et al., 1983), and final degree classification (Smith & Naylor, 2001a). Socio-economic backgrounds of school leavers can be assumed to be based on that of their parents, whereas the economically independent older students can be assumed to be independent of their parents, both socially and economically (Department of Education, Training and Youth Affairs, 1998a, 1999a). This may indicate an even narrower range of socio-economic backgrounds among older non-recent school leavers. While parents from lower socio-economic backgrounds with young recent school leavers may make financial sacrifices, older non-recent school leavers from lower socio-economic backgrounds often have other commitments and may not undertake studies to the same extent. A longitudinal Australian study (Urban et al., 1999) suggests that socio-economic factors affect final completion rates only marginally, in particular among students who had recently left school. Reay, Davies, David and Ball (2001) illustrate the process of making a choice to enter higher education is qualitatively different for mature age students from differing socio-economic backgrounds. Choices are constrained by a blend of academic, social and economic factors in the process of choosing a new context where they may feel at ease.

Other studies suggest student socio-economic factors are not important predictors of academic performance in higher education (Beekhoven et al., 2002; Long et al., 1995; Ramsay et al., 1996; Rego & Sousa, 1999; Zalaquett, 1999). Abbott-Chapman et al.(1992) suggest this may be the case for high achievers where disadvantage may carry less weight. However, weak academic performance together with socio-economic disadvantage is more likely to lead to

discontinuation. Outcomes of research examining occupational background and degree classification support this (Smith & Naylor, 2001a). In examining the reasons for students discontinuing their studies, Sharma and Burgess (1994) found that financial reasons were contributing factors in the later years of a course. Yorke (1999b) similarly found financial reasons were cited for withdrawal among students from under-resourced locations.

The strong influence of socio-economic factors among young Australians in choosing a university education, in particular within the metropolitan areas, is illustrated in a recent report of Stevenson, Evans, Maclachlan, Karmel, and Blakers (2000). With socio-economic factors impacting on the transition to university due to prior context effects on school achievement (Parker et al., 1993), commencing students are already more socio-economically homogenous. It is plausible that this may explain the marginal effects of socio-economic factors in a number of Australian studies at the institutional level. Differences in the socio-economic backgrounds of enrolled students may be more apparent at the course level. In particular, in terms of the choices students make in proceeding through their courses, students from lower socio-economic backgrounds may not have the option of taking time out from study. Options may be limited and the choice to remain maybe the best option. Understanding the contextual choices students make as they find their way through higher education is crucial to understanding the interaction of socio-economic factors with their progression.

Urban and rural residence In Australia, differences in university participation rates between regions have been linked both to socio-economic differences and the proximity of student residential areas to university (James et al., 1999a; Stevenson et al., 2000). Differences in participation rates among

regions also point to cultural differences in community attitudes towards education (James et al., 1999a; James et al., 1999b; Stevenson et al., 2000). Many young students from Australian rural and isolated areas and possibly outer metropolitan areas have limited educational and social support and resources, and are assumed to be at a significant disadvantage in accessing university (Martin, 1994; Parker et al., 1993; Young, 1998). Further more, upon entry to university such students are reported overall to have low retention and completion rates within higher education (Department of Education, Training and Youth Affairs, 1999a; James, 2001; Lewis, 1994; Long et al., 1995; Ramsay et al., 1998; Urban et al., 1999). Despite relocation to urban metropolitan universities, some students may continue to be disadvantaged educationally on account of financial pressures and the disruption of re-location to urban areas. However, other factors may interact. The sacrifices made by disadvantaged groups may contribute to a persistence to reach course completion. Urban et al. (1999) found rural women who had not left school recently, were more likely to complete than a similar group from urban areas.

Although there are undoubtedly a range of reasons contributing to disadvantage in access to university, little is known of the academic choices and the pathways through higher education of those rural students who do commence higher education. Australian research (James, 2001; Stevenson et al., 2000) suggests educational disadvantage is a complex issue not only limited to distance and socio-economic factors. Further research is needed into the pathway choices and academic outcomes in higher education to address this equity issue.

In summary

The pathways chosen by students as they proceed through undergraduate courses are assumed to be both complex and varied. However, research has

overlooked the possibility of changing relationships between students and the learning contexts of their courses in creating these pathway choices over time. Restricting investigations to associations between student characteristics and behaviour outcomes and omitting any one of these components (contexts, pathway choices, student characteristics and an extended time frame), overlooks the broader picture of student progression while possibly contributing to the already substantial proportion of inconclusive evidence. Consistency and clarity in definitions of behaviour outcomes and enrolment choices such as retention, completion, stop-out and withdrawal is also needed.

Despite the vast amount of research attention paid to student behaviour outcomes in higher education, to the range of institutional settings and to student characteristics and demographics, there remains a need for an appropriate theoretical framework relevant to Australian higher education for explaining the pathways of progression students choose to take over time.

CHAPTER 5

HYPOTHESES

This project proposed a theory of the pathways that students take within the context of undergraduate courses at university. Past theoretical approaches and empirical research indicated a fresh approach was needed to explain student progression at university within the Australian context. In particular, it was proposed that a socio-ecological perspective provided a new and appropriate framework for investigating the progression of undergraduate students. It was assumed that student progression pathways and corresponding behaviour outcomes were a function of student characteristics, of features of the learning contexts, of the diverse student responses to these contexts, and, of differential impacts of learning contexts upon a student. It was expected that the interactions of course context and the responses of students to their respective courses contributed to the diversity of pathway choices. In particular, the background characteristics and demographics of a student and the characteristics and constraints of the course in which the student was enrolled were assumed to interact with the enrolment choices each student made as they chose a pathway over time through various learning contexts within university. Student university records and indicators of behaviour outcomes provided foundation data for this research.

The courses within the university were considered as distinct learning contexts. In principle, students experience a variety of cultural settings at university. The more immediate learning context for a student within this diversity of contexts is their course of enrolment. This learning context is assumed to encompass both the specific course in which they have enrolled, together with

their fellow students within these courses. The focus of this research was on the responses of students to the learning context of their course as evident in their behaviour outcomes.

The characteristics and demographics of students, together with aspects of the course itself, were expected to influence enrolment choices of continuing, leaving their studies or changing or transferring temporarily to another course. Choice behaviours index the student experiences of a course in terms of course requirements, types of assessments, curriculum content, peer groups, associated teaching staff as well as other social and academic opportunities. It was expected these learning contexts varied and changed in response to the academic choices and the characteristics and demographics of the students enrolled at each stage.

Following course entry and the various yearly course assessments, each student chooses to re-enrol or to withdraw, to stop-out or to transfer enrolment to other courses. Pathway choices were described with reference to enrolment within the first course of enrolment. The history of a student's enrolment over a number of years from course entry, namely the choices of re-enrolment, temporary stop-out, transfer to another course, completion or withdrawal from the course altogether, outlined a student's pathway options as they progressed through various learning contexts within the university system. In terms of the constraints of a course, a student has some degree of choice in the annual course enrolment and therefore their progression pathway over their time at university. This means that there is no ideal pathway through a course in terms of the student enrolment and years to completion.

Pathways of progression were assumed to be a function of student enrolment choices made over time within each learning context. Both the

individual student and the learning context itself were considered part of the mechanism giving shape and direction to these future choices. Each specific learning context incorporates aspects of a specific course such as curriculum content, teaching styles, assessment, the location of the course, as well as the background characteristics and demographics of the students enrolled in the course. Each learning context was expected to change over time with changes in both these aspects. The learning contexts were modelled as a function of the characteristics of both course and students:

$$\text{context} = \{\text{course characteristics} \times \text{student characteristics/demographics}\}$$

Individual pathways of progression through undergraduate courses were considered as a function of four underlying theoretical components - the course itself, the characteristics and demographics of the students within this learning context, student enrolment choices and the passage of time following from course entry. Student progression was hypothesised as the end product of interactions between these four underlying components:

$$\text{progression pathway} = \text{choice} \times \text{time} \times \text{course} \times \text{student characteristics}$$

A contextual theory of pathways through higher education considers student characteristics in relation to the choices that students make over time in particular course contexts. Thus the Pathways Theory integrates four main components:

- characteristics of people
- the course as a learning context
- particular choice behaviours (e.g. enrol, leave, transfer), and,
- time in terms of the calendar year as well as the academic year.

Evidence to support Pathways Theory

The evidence to support the Pathways Theory builds on three conditions. The first is that student behaviours over time create many diverse pathways

through learning contexts. This condition is satisfied by evidence of diverse pathways, and would be rejected if sequences of student behaviour were homogeneous. Yet this evidence alone is not sufficient.

The second condition is that the outcomes are sequences of behaviour that are particular to each learning context. In this case, the learning context is conceptualised as an undergraduate course at university. Building on the first condition, the evidence needs to contextualise patterns of student behaviour at the course level. This means that the pathways are distinct for each course. This idea would be rejected if there are a common set of pathways across these learning contexts. This would indicate that students are responding to the university context as a whole, rather than to specific course contexts.

The third condition that supports Pathways Theory is that specific characteristics of the same cohorts of students in each course context are salient at different points along these pathways. Provided the first two conditions are met, evidence to support this condition would show changes over time in the impact of specific personal and social characteristics on the paths that students take through their learning contexts. This condition would be rejected if there are constant effects of specific characteristics.

Responses to each of the following hypotheses illustrated the extent of support for the pathway approach to student progression.

Pathways of progression

Hypothesis 1.1 Pathways of progression through university are characterised by enrolment, withdrawal, temporary stop-out and transfer to other courses (*choice by time*).

In principle, there are many possible pathways of progression through the university. A pathway pattern indicates a student's academic choice over time. Pathway patterns of all of the students would indicate the degree of diversity of *enrolment choice over time* within the general university context.

Hypothesis 1.2 Students take many different pathways of progression within different learning contexts within the university (*course by choice by time*).

Pathway patterns of students within each of the courses would show the extent of variation in profiles of *enrolment choice over time* across the different learning contexts of *courses*.

Hypothesis 1.3 Diverse background characteristics and demographics of students can be found at each stage of their course within the learning context (*characteristics by course by time*).

An investigation of pathways through different courses first describes the students who chose to enrol in these courses. This includes background characteristics and demographics at course entry. Presenting the diverse individual characteristics and demographics in first year of a course and at each subsequent stage of enrolment, would provide descriptions of those students who choose to enrol in the learning contexts at various stages of courses.

Profiles of the selected background characteristics and demographics within each course for each calendar year following course entry were expected to indicate different profiles of *characteristics and demographics over time* within the different learning contexts of *courses*. Similarly the profiles within each

consecutive academic year in which a student was enrolled were expected to indicate different profiles of *characteristics and demographics over the years of enrolment* within the different learning contexts of *courses*.

Student behaviour outcomes of annual performance, retention and attrition, and completion are inextricably linked to the academic choices made by students over time.

Performance

Hypothesis 2.1 Background characteristics and demographics of students entering a course predict academic performance in subsequent years (*performance by time by characteristics by course*).

Annual course performance is an outcome of students who choose to enrol or re-enrol in their course in a corresponding year. Passing all enrolled units of study (UOS) in a given year is the indicator of successful performance. Evidence would show where particular characteristics or demographics predict performance in each year. Examination of performance data at specific stages of actual course enrolment rather than in sequential calendar years from course entry would enable both choice and time to be held constant within each course for each analysis.

Completion

Hypothesis 3.1 Background characteristics and demographics of students entering a course predict course completion in the subsequent years (*completion by characteristics by course*).

Course completion is a possible outcome following a series of choices to re-enrol. To complete in the nominal time of a course indicates these choices of

re-enrolment have been kept to a minimum. Completion can be considered a composite indicator of performance viewed longitudinally with ‘choice’ held constant and ‘time’ seen in terms of a larger block of time over a number of years. As distinct from academic performance in a single enrolment year, or in a series of single enrolment years with intervening breaks, an indicator of course completion would be an indicator of successful individual performance over a number of years. Despite the possibility of leaving the course at some stage, students who complete their course within a minimum number of enrolled years do not necessarily complete in consecutive calendar years. Although these students may take time out from studies, when enrolled they will have performed consistently well academically. If there were any failures, such UOS would have been re-taken without additional years of enrolment. As an example, this could have been achieved by successful completion in summer school of a unit previously failed. Indicators of completion in the nominal time generally indicate that UOS have been completed at the first attempt. Consequently, course completion in minimum time, the nominal time of the course, is considered as an indicator of *consistent* successful performance.

Within each course, evidence would show where particular characteristics or demographics of students predict course completion.

Hypothesis 3.2 Background characteristics and demographics of students entering a course predict completion of the course in minimum time (*completion by characteristics by course by time*).

Within each course in the year representing the minimum time to completion for the course, evidence would show where particular characteristics

or demographics of students predict course completion.

Retention and attrition

Hypothesis 4.1 Background characteristics and demographics of students entering a course are associated with retention or attrition in subsequent years (*retention/attrition by time by characteristics by course*).

In principle, each year students make a choice to leave or remain enrolled within their course. For each calendar year, associations between each of the selected background characteristics and demographics of students at course entry and the choices of enrolment or non-enrolment would indicate the characteristics and demographics associated with making this choice.

Hypothesis 4.2 Background characteristics and demographics of students entering a course are associated with retention and attrition, following an initial break in enrolment, in subsequent years (*retention/attrition by time by characteristics by course*).

Students who leave a course may or may not return at a later time. Students have the choice to return to their course and re-enrol or to permanently withdraw following their initial break. Some students *remain enrolled* while others who are *not enrolled at a specific stage return* later. Although some time is taken out from their courses, a student's return within the time-frame of this research was interpreted as an overall retention within their course with the possibility of later completion. What characteristics and demographics are

associated with this enrolment choice, *to enrol or leave AND return*? For each calendar year, evidence of associations between each of the selected background characteristics and demographics of students at course entry and the choice to enrol or leave but return later, would indicate the characteristics and demographics associated with making this choice.

Similar comparisons can be made between those students who remain enrolled and those who leave the context *without returning*. Some students leave a course *permanently* before completion, either transferring out or withdrawing altogether, while others *remain enrolled*. What characteristics and demographics were associated with this enrolment choice, *to enrol or leave with NO return*? For each calendar year, cross-tabulations between each of the selected background characteristics and demographics of students at course entry and the choice to enrol or leave without returning would indicate the characteristics and demographics associated with making this choice. These comparisons would provide information about the choices of students who were not included in performance assessments in specific years and who may not be included among those who complete.

Hypothesis 4.3 Background characteristics and demographics of students entering a course are associated with forms of retention and attrition characterised by withdrawal, temporary stop-out and course transfer in subsequent years (*retention/attrition by time by characteristics by course*).

Students have a range of academic options as they choose each year to remain, to leave or to return to their course. For each calendar year, cross-tabulations between each of the selected background characteristics and

demographics of students at course entry and each pair of possible enrolment choices would indicate the characteristics and demographics associated with making these choices.

As population data is used here, the findings can be accepted as direct evidence. In a theory of pathways in context, it is not appropriate to generalise beyond this substantial group of students over time.

CHAPTER 6

METHOD

Design

Student progression and behaviour outcomes were examined in undergraduate courses within an Australian university. Student pathways of progression and behaviour outcomes were modelled longitudinally as a function of:

- student background characteristics and demographics
- sequences of student choice behaviours
- learning contexts as undergraduate courses
- time from course entry

The longitudinal design involved four areas of behaviour outcomes (progression, academic performance, retention and attrition, completion) within the learning contexts of seven courses. Students were followed longitudinally over eight years from first admission to a course. Enrolment choices over the eight years, choices such as withdrawal, stop-out, re-enrolment and transfer to other courses, were recorded for each student. The progression pathways of each student were observed in terms of these choices. The PISC method (Robinson, 2004) recorded this longitudinal progression pathway at the student level. Outcome indicators over time were investigated as a function of the interaction between a selection of student background characteristics and demographics, the learning context of a student's course, their academic choices of enrolment and the time from course entry.

Ethics and access

Approval to undertake the research was applied for and granted by the

Ethics Committee of the University (Appendix A2.1). Permission was also sought from the University to access files from the annual Higher Education Student Collections over the period 1994-2001 (Appendix A2.2). Appendix A3 provides a glossary of technical words, terms and acronyms used throughout this project.

Data

Data source files

Data was sourced from the following:

- 1994-2001 annual Higher Education Student Collections administered by the Australian government
- student data held by The Student Centre, The University of Sydney relating to selection and admission of students in 1994.

Appendix A4 provides further information on the data sources and the validation of data. These are data sources presently available to government and universities for information relating to higher education.

Selection of student data

Data was required over several years beyond the nominal length of each course. The time span of the research covered 1994 to 2001. Student enrolment data was extracted from the Higher Education Student Collections (Department of Education, Training and Youth Affairs, 2000) submitted to DETYA annually by the University over the period 1994-2001. Students were initially selected from the 1994 Higher Education Student Collection Enrolment File and Load File (third submission). Course information was also extracted from the 1994 Load File (third submission). Additional information was gathered from other files in the Collection, together with other files relating to university admission held by The Student Centre at The University of Sydney. Table A5.1 (Appendix A) presents definitions and sources of general data terms.

Any inconsistencies in data, errors in coding and duplicate student identification numbers were minimised by means of data validations and cross-checking of inconsistencies with other sources. Information on the recording of course completions and difficulties with matching course codes are noted in Appendix A4. Multiple data sources of variables are indicated in Appendix A5.

Variable selection

Learning context

The academic contexts of courses, the curriculum content, teaching methods and assessment practices, are the direct responsibility of faculties in Australian universities. Faculty responsibilities include selection, quotas on courses, admission and transfer of students, and UOS. Other responsibilities include the approval of courses, the co- and pre-requisites for UOS, the compulsory UOS and, the organisation of the teaching and assessment of courses. The central place of the faculty as a unit of operation within the academic process is clear. Although the context of teaching and learning for each student is influenced significantly by circumstances at the faculty level, each faculty has a range of distinct courses within its responsibility. These courses, with differing UOS, content, teaching staff and enrolled student groups, are assumed to function as distinct learning contexts. The more immediate learning context for each student is assumed to encompass both the specific course in which they have enrolled together with their fellow students within these courses.

Besides faculty and course, there are other classifications of academic areas within higher education in Australia. Neither of the two more frequently used government approaches to classifying subject matter, the Academic Organisational Unit and discipline, correspond readily within organisational and administrative contexts of teaching and learning within the university. The field of

study classification, although developed specifically for the categorisation of courses based on potential occupation, is more akin to course content than are the discipline groups or Academic Organisational Units. In the Australian higher education system, the course is the appropriate unit to define the immediate learning context for students.

Procedures used to select courses and the background characteristics and demographics of students within these courses follow.

Courses

Courses for the project were selected first, followed by the selection of students within courses. The initial selection criteria for each course included:

- undergraduate bachelor level with course entry available to school leavers
- adequate numbers of commencing students
- availability of the course on the main campus

In addition, the courses were to include as a group:

- variety in course content
- both general focus and vocational courses
- variety in community demand

Course selection aimed to include a variety of cultural contexts within the general university context. Within the present theoretical perspective centring on the interaction between students, their learning contexts and the choices students make as they progress through university, focus was initially on those students commencing university for the first time. The transition from the context of the school to the context of the university is a significant change in terms of cultural surroundings and expectations. With this in mind, selected courses were restricted to those undergraduate bachelor level courses with course entry available to school leavers at the first year level. Courses were omitted which were in the

process of being phased out or in the process of structural change, for example a new graduate medical degree.

It was logical that the frequency of missing data would increase across the years, due largely to the cumulative increase in completion status together with a cumulative increase in the number of students leaving or transferring from their course. To make allowances for this, and to provide for a substantial number of students within a cross-variable breakdown of data for analysis, it was necessary to have adequate student enrolment numbers at course entry. A minimum number of 100 students was chosen as an approximate guide (Peng, So, Stage, & St.John, 2002). Furthermore, there were difficulties associated with availability and reliability of linking some student record data held at the main campus with data from other campuses. As a consequence, the selection of courses was restricted to courses available on the main campus. Data was selected initially from students who commenced in 1994.

In order to select a range of courses varying in content, focus and demand, courses were selected from different faculties and different fields of study. This would provide courses within the content areas loosely grouped into 'humanities and social sciences', 'science and technology', and 'health sciences' (Hativa & Marincovich, 1995). Courses were selected from faculties that vary in terms of vocational specialisation and general non-vocational courses. Courses were also to vary in terms of community demand. Demand for courses was evident from media reports (for example, Moodie, 2002, p.24), from information on course preference and from the availability of student places (Universities Admissions Centre (NSW & ACT), 1993). A high demand course, with a large proportion of students in their preferred course, was expected to be different in student outcomes from a

course lower in demand containing a large proportion of students who preferred to be in other courses. The ratio of student first course preferences to commencing first year course enrolments, an indication of the match between student enrolment and demand, provided a criterion for course selection. Courses varying in demand could be expected to be different in context and their perception amongst the community (Department of Education, Employment, Training and Youth Affairs, 1998; Linke et al., 1991a) .

Course selection addressed each of the initial selection criteria. In cases where courses within this initial selection were included within the same faculty or within the same field of study with similar vocational specialisation, the course with the smaller enrolment of commencing students was eliminated from the selection pool. If two courses came from the same faculty, the courses were compared across other criteria to ensure variety. This process resulted in six courses from six different faculties remaining in the selection pool. As there was no course which could be regarded as high demand with a vocational focus, another course was sought. A high demand, vocationally-oriented course with science-based content was included. The field of study and the administrative faculty of this course were not included amongst other courses within the initial selection. The commencing enrolment for this course was lower than other selected courses. Inclusion was also justified on the grounds that attrition from this course was expected to be low given the high demand for the course and the level of course admission criteria.

Table 6.1 provides further information on the seven selected courses. The selection included courses that were dominated by women and by men. Courses catering for both full-time and part-time students were represented. School

achievement levels for entrance to courses are indicated by the Tertiary Education Rank (TER) cut-off (Universities Admissions Centre (NSW & ACT), 1993).

Table 6.1

Characteristics of Selected Courses

Course	N	TER cut-off ¹	1 st pref ²	Dom. Gender ³	FOS ⁴	Attend ⁵	Course length ⁶	Humanities & Social Sc	Science & Tech.	Health Science	Focus			Community Perception		
											General	Vocational	Low	Med	High	
Arts	1074	75.95	1.90	F	3	F/P	3	*			*		*			
Commerce	300	92.30	2.90	M	4	F/P	3	*				*			*	
Education	110	70.20	3.20	F	5	F	4	*				*		*		
Engineering	148	86.00	1.80	M	6	F	4		*			*			*	
Nursing	315	55.00	1.20	F	7	F	3			*		*		*		
Pharmacy	168	93.55	3.50	F	7	F	3			*		*			*	
Veterinary Science	72	97.05	10.20	F	10	F	5		*			*				*

Note. ¹TER cut-off: excludes TER below Main Round cut-off (Universities Admissions Centre (NSW & ACT), 1994a)

²Ratio of 1st course preference applications to course quota places for 1993 admissions (Koder, 1995)

³Gender with the highest percentage of enrolments

⁴Broad Field of Study: 3=Arts, Humanities and Social Sciences, 4=Business, Administration, Economics, 5=Education, 6=Engineering, Surveying, 7=Health, 10=Veterinary Science (Department of Education, Training and Youth Affairs, 2000).

⁵Attendance type: F=full-time, P=part-time (Universities Admissions Centre (NSW & ACT), 1993, p.28-29).

⁶Nominal course length in years for students enrolled full-time.

In summary, seven courses were selected from the undergraduate bachelor level courses offered in 1994 on the main campus of the University. The courses had an adequate enrolment of commencing students in 1994. Courses varied in the nominal time for completion, in content, in focus and in the general community-held perception of them. First year commencing students in 1994, in each of these courses, were selected. The course was their 'major' course and their attendance was 'internal' (see Table A5.1).

Characteristics and demographics

The selection of background characteristics and demographics of students was restricted to those available from student records. Given the confidential nature of student record data, it was not possible to follow up individual students for further information. This meant that the choice of variables was limited by the availability of data within official data sources.

From a socio-ecological perspective, a number of background characteristics and demographics appear relevant to the progression and performance outcomes of an extended longitudinal study. Although not necessarily based on longitudinal studies at the student level of data and beyond the nominal length of courses, past research provides support for the choice of these characteristics and demographics. The percentage of recent school leavers amongst university admissions data in 1994 indicated a range of ages, both among school leavers and older students, across the courses (Universities Admissions Centre (NSW & ACT), 1994b). It was likely that individuals who proceeded to university directly from school would be different in many ways to those who commenced university later. Maturity, the impact of life experiences and the passage of time were all possible contributing factors. With this in view, the analysis of behaviour outcomes of recent school leavers (RSL) and non-recent

school leavers (NRSL) were undertaken separately. Similarly, students attending university full-time (FT) and those attending part-time (PT) could be different, in particular with the time taken to completion. As part-time students generally have less time and other commitments, it was assumed that attendance type would be a significant factor in progression. Thus the variables selected included age, recency of schooling and the attendance type at course entry. Age was divided into younger students, those 20 years or less, and students who were older than 20 years (University of Sydney, 2005). The older category was further divided into two categories when a distinction was required between students who were young but not necessarily recent school leavers and older students (Department of Education, Training and Youth Affairs, 1998a, 1999a; Dobson & Sharma, 1993).

The gender of students may have been an important factor in choices and outcomes particularly within courses where gender was not evenly balanced. The level of school English and the home language of students were expected to be relevant to academic performance and progression (Jones et al., 2000; Learning Assistance Centre, 1995). School achievement has been shown to be linked to performance and to course completion. Preference for a course, ranked prior to course entry, provides some indication of student aspirations for a course and perhaps for their feelings of satisfaction after commencement. Information from previous schooling, including school achievement, school English level, course preference together with home language background was included. For students who had not recently left school, there was no information available for school-related variables.

The educational and social background of a student was likely to have an intervening effect on subsequent academic performance. Cultural background,

geographic location, economic support can be assumed to be significant factors influencing educational achievement. Lack of educational qualification is a factor related strongly to socio-economic disadvantage among Australians (Australian Bureau of Statistics, 1998). This socio-economic advantage or disadvantage is closely linked to areas of residence. The Bureau of Rural Sciences reports that socio-economic disadvantage is less widespread within metropolitan areas of Australia (Bureau of Rural Sciences, 1999). Although there would be some students from non-metropolitan areas enrolled at university and some from disadvantaged areas within metropolitan areas, an over-representation was expected of students from areas of high socio-economic advantage.

The choice of the SEIFA Index of Education and Occupation (IEdOcc) as a socio-economic indicator was based on the assumption that it corresponds to the resources available in the community. It is plausible that socio-economics would influence a student's aspirations for furthering their own level of education and occupation in higher education, either directly from school or later as a mature student. The IEdOcc allocates socio-economic ranking on the basis of the average index of a residential postcode area. Among available indicators, the IEdOcc is the most appropriate and was applied to the postcode of the area in which the student resided out of semester time. McMillan and Western (McMillan & Western, 2000) provide further discussion. Urban and rural backgrounds of students were classified by the 1992 classification of postcodes by the Commonwealth Department of Primary Industries and Energy (DPIE).

Table A5.2 presents definitions and sources of each of the following student characteristics and demographics which may influence choice behaviours in subsequent years: age, gender, socio-economic background, rural or urban

classification of home address, school achievement, school English level, home language background, course preference, attendance type and recency of leaving school.

Academic choices

Students have a number of options of enrolment choice in each year following course entry. Course choices were categorised as follows:

- enrolment or re-enrolment
- leave either permanently (withdrawal) or temporarily (stop-out)
- transfer to another course either permanently or temporarily
- leave following completion

No distinction was made between voluntary and in-voluntary withdrawal. Definitions of the various enrolment choices can be found in Table A5.3. Table A5.4 documents descriptions and coding values of variables used in this project.

Organisation of longitudinal data

Consistent with a longitudinal view within a socio-ecological perspective, data was structured in two arrangements. Longitudinal data was presented firstly in terms of sequential calendar years following course commencement and secondly in terms of the sequential years of each student's enrolment disregarding any years of non-enrolment in a course. The first approach allowed for comparison between those students enrolled and those who have transferred, withdrawn or completed in a specific calendar year. The second approach presented sequential years of each student's years of study and the context experienced by each student in each year in which they are enrolled. As some students withdrew, stopped-out or transferred, the year of enrolment was therefore not necessarily the same calendar year for all students. Appendix A6 outlines in detail the organisation and arrangement of data and comparisons between the two

approaches.

Student behaviour outcomes

The application of the Pathway Model of progression to the following student behaviour outcomes was examined:

- progression pathways
- academic performance
- course completion
- retention and attrition

Evidence of interaction or association between each of the four components of the model provide support for the theoretical perspective and the Pathway Model. It is argued that performance, completion and retention/attrition outcomes need to be considered together as an index of student choice behaviours.

As an indicator of performance, the SPU was used for each successive year of enrolment within a course. Research interest was in the overall successful or non-successful annual student performance. As a consequence, each annual SPU was converted to a dichotomous categorical variable, indicating whether a student passed or did not pass *all* enrolled subjects within a particular year.

Course completion referred to successful completion of all academic requirements of the course and was not synonymous with graduation or the conferring of a degree. An additional indicator, completion in minimum time, was included. *Minimum time* was defined as the nominal time for a specific full-time or part-time course.

The definitions of retention and attrition used in this research were modifications of definitions in general use. Outcome indicators of retention and attrition generally refer to enrolments and non-enrolments from one year to the following year. Within the longitudinal approach of the present theoretical

perspective, retention and attrition were viewed over a longer period of time. Attrition referred to students who left the course, having neither graduated nor returned to study over the entire period of the present research. Retention referred to students, other than those who had completed, who remained enrolled within their course or *returned to study* within their original course following a stop-out or transfer. Retention covered a wider time-frame and took into account those students who had left only temporarily.

Specifications and definitions of student outcomes can be found in Table A5.3. Where specifications have been extracted from the Higher Education Student Collection-Main Documentation 1994, this has been noted. Further information on variables and terms relating to the annual Higher Education Student Collections can be found in Higher Education Student Collection documentation (Department of Education, Training and Youth Affairs, 2000).

Analytical tools

The population data obtained was a set of information from student records. There was no sampling within the study and the usual sources of sampling error did not occur. Research was not concerned here with the generalisation of results to all universities and courses but rather with investigating the appropriateness, usefulness and adequacy of the model of student progression within the present selection of courses. The selected students represented all students within the courses selected and were not a sample, random or otherwise. Similarly the selected courses could not be treated as a random sample from a population of university courses. It was possible that certain groups of students however may not have been typical of the usual groups of such students. Results were seen in terms of trends and patterns. The selected group of students was large.

Frequency analyses were used to describe distributions of variables such as the context of courses, the characteristics of students, the frequency of academic choices, progression outcomes and progression pathways. The majority of variables within the research were discrete or categorical variables. Descriptive statistics were used to investigate the distribution of the continuous variables however. Cross-tabulations and the chi-square test of independence were used to investigate relationships between pairs of discrete variables. Bi-variate correlations assessed associations between variables.

Modelling the present data using multilevel procedures (Goldstein, 1995) with the limited number of selected courses (level 2 units) would have inevitably led to unreliable results. As no direct comparisons were to be made between courses, the single level modelling procedures were used. Within each specific course context, logistic regression was used to predict the binary dependent variables representing each annual performance outcome and each completion outcome, from various student characteristics and demographics at course entry. Logistic regression does not assume a linear relationship between the outcome variable and the independent variables. This method is a flexible and appropriate technique with no underlying assumptions about the distribution of predictor variables. In addition, error terms are not assumed to be normally distributed.

The logistic function

$$F(z)=1/[1 + \exp (-z)]$$

describes the mathematical form on which the logistic model is based. The logistic model defining the probability of an event occurring, such as passing all UOS in the year or completing a course, is represented by the following

$$P(X)=1/\{1 + \exp[-(\alpha + \sum\beta_i X_i)]\}$$

The unknown parameters in the model, α and β_i , require estimation in order to fit the model to the data and to obtain the probability of a student passing all units or course completion. The logit transformation in terms of the parameters of the logistic model is

$$\text{logit } P(X) = \alpha + \sum \beta_i X_i$$

This expression gives the log odds for the outcome, such as passing all UOS, for students with a set of characteristics represented by X_i . The coefficient β_i represents the change in the log odds that would result from a one unit change in the variable X_i when all the other X variables are fixed. The exponentiated coefficients can be interpreted as odds ratios (OR), comparing for example the odds for students passing all units and indicated by 1, relative to the odds for students who have not passed all units within the year, indicated by 0. The log odds for a student with '0' is represented by ' α '. Parameter estimates are obtained through the method of maximum likelihood.

The numerical adequacy of cases relative to the number of variables in each model was checked prior to each logistic regression analysis. Prior to each logistic regression, cross-tabulations of the frequency of the dependent variables against each independent variable were examined. Those cases where cell frequency was low were noted. In these cases the reliability of goodness-of-fit tests may have been affected and such cases were considered when interpreting results. Multicollinearity between predictor variables within the context of each course was also examined. Predictor variables highly correlated with one another may explain any inflated standard errors of the logit coefficient.

In tabling the results from analyses using logistic regression, the unstandardised logit coefficients (B), and the standard error of B (SE) for each

independent variable were reported for each analysis. The significance of the Wald statistic was used to indicate the significance of the individual regression coefficients for each independent variable. The Wald statistic was calculated using $(B/SE)^2$ and interpreted as a chi-square statistic. The log-odds coefficients were converted into the odds ratios for the predictor variables. The odds ratio is the exponentiation of the coefficient B, that is, e^B . The statistical significance of the overall model itself, the model chi-square, was also noted for each analysis. As an overall model test, the model chi-square indicated the probability that the independent variables as a group made a difference in the prediction of the outcome. The test does not indicate that *every* independent variable is significant. Outliers (studentised residuals >2) were noted for those students whose outcome was not well predicted in the solution.

Further procedures and methods used in the analysis of student outcomes are described in the corresponding chapters.

Software

The statistical package SPSS for Windows (2003) was used for analyses.

CHAPTER 7

LEARNING CONTEXTS

Learning contexts were modelled as a function of the characteristics of courses and of enrolled students. These contexts are considered in terms of a wider university encompassing a range of courses and their enrolled students. In principle, students experience a variety of learning contexts while at university and are also influenced by family, work and leisure activities. This research will focus on the specific learning contexts of courses.

University context

The selected university is a large established university with a wide range of courses involved in both teaching and research (Universities Admissions Centre (NSW & ACT), 1993). Most students commute although a small proportion is resident within campus colleges (Department of Employment, Education and Training, 1993, p. 207 notes 15% of Australian students in 1984). At the commencement of this project, there were over 40,000 students (including approximately 22,000 enrolled in undergraduate bachelor level courses). Admission to undergraduate courses was competitive and in some cases there were additional selection criteria. Admission was dependent on the entry requirements determined for each course, the student admission quota for each course, and each applicant's stated preference for the course. The university required enrolling students to have either completed their secondary school studies, or to have undertaken a year of full-time tertiary study or an approved preparation course. In 1994 there were 10,595 commencing students, 57% were women, 72.9% were full-time and 23.9% were part-time. There were approximately 6,500 commencing undergraduate students (Department of

Employment, Education and Training, 1995). The selection of students for this research, represented 33.7% of all commencing undergraduate students across all undergraduate courses at the university in 1994.

Course contexts

Frequency distributions, cross-tabulations, correlations and other descriptive statistics are used to describe the learning contexts, at the time of course entry, in terms of student background characteristics and demographics.

At the commencement of each course, frequency and percentage distributions for each of the student background characteristics and demographics are presented within Tables B1.1-B1.10 (Appendix B). Figures B1.1-B1.10 further illustrate graphically, the percentage distribution for each of the selected background characteristics and demographics across courses. Descriptive statistics for the two continuous variables representing school achievement (TER) and socio-economic background (IEdOcc) are in Tables B1.11-B1.12. For some analyses these two variables have been converted to categorical variables representing variable quartiles. Tables B1.7-B1.8 present the frequency and percentage for these quartile distributions. Tables B2.1-B2.8 present the inter-correlations between each of the student characteristics, indicating relationships between these variables within courses at the time of course entry.

Tables B3.1-B3.2 presents a series of cross-tabulations, attendance type by school leaver status, across courses with the frequency and percentage of students within three groups, FT-RSL, FT-NRSL and PT students. Although only two courses are officially part-time courses, some other courses have small numbers of students enrolled part-time. Such enrolments may refer to students ‘catching up’ on UOS which have become out of sequence for a number of reasons including unsuccessful previous attempts. It is also a possibility these may be students

entering the course with credit from other institutions and have been allocated a reduced workload in a specific year. It can be assumed such students would be attempting the course within the statutory years of a full-time course.

Profiles of the characteristics and demographics of students within each course at course entry follow. Proportions are based on the total group enrolled. However in some instances demographic information was not available and in these cases the proportion was based on cases with available information. Figure 7.1 shows for each of the background characteristics and demographics, the number of students within each course as a proportion based on available information.

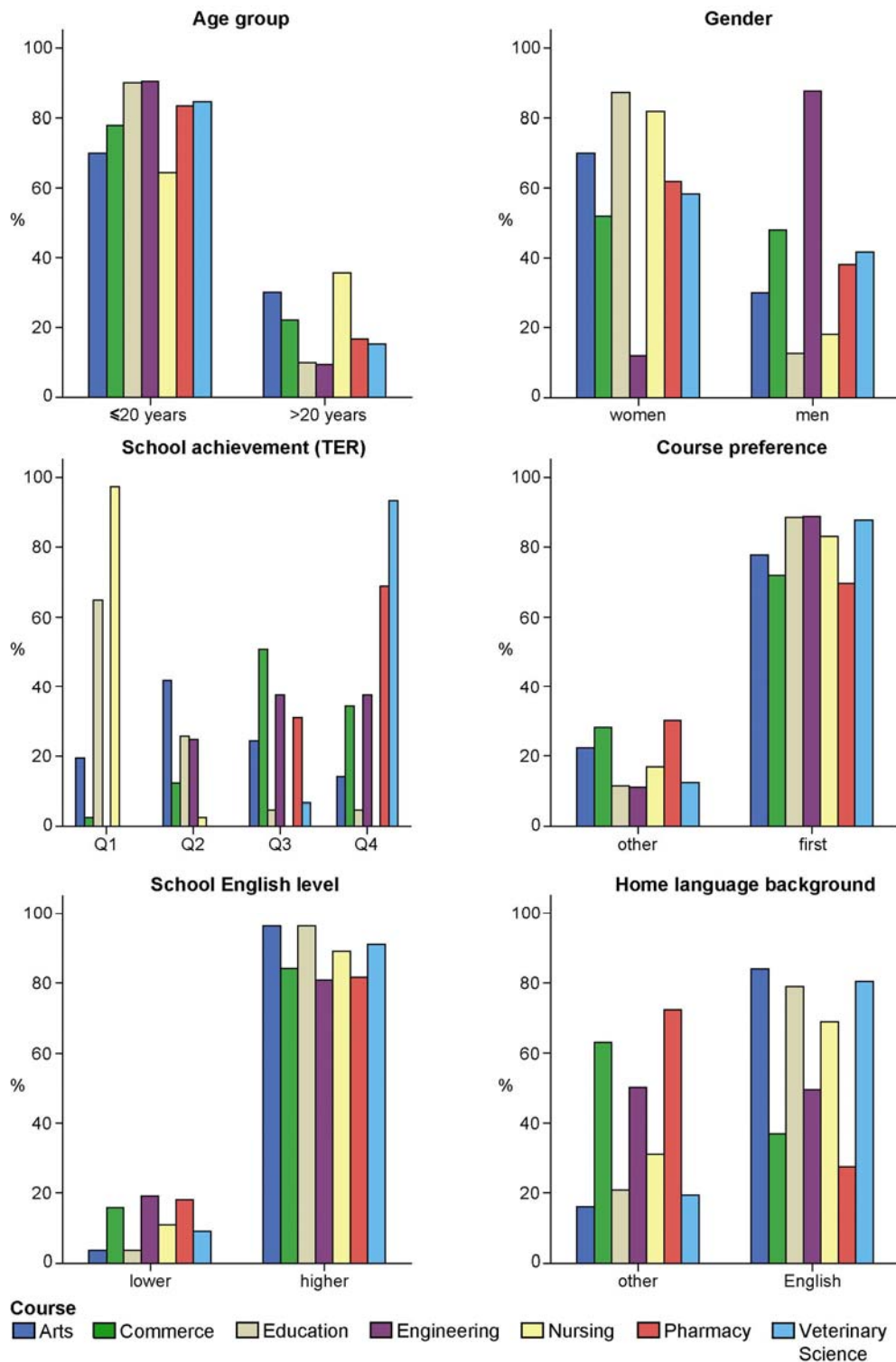


Figure 7.1. Percentage distribution of student background characteristics within each course at course entry. Figures show the number of students as a proportion based on available information. Characteristics: age group, gender, school achievement, course preference, school English level, home language background, rurality, socio-economic background, attendance type and school-leaver status.

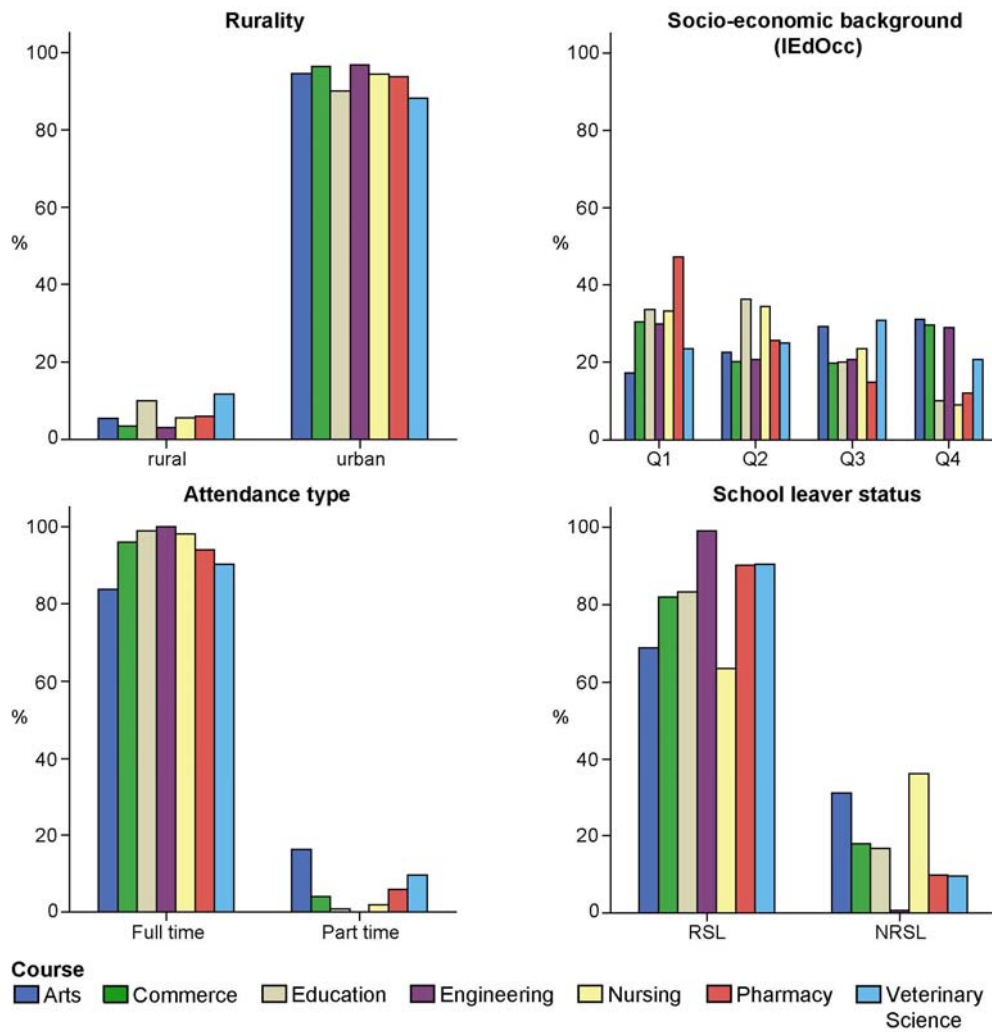


Figure 7.1 (continued). Percentage distribution of student background characteristics within each course at course entry. Figures show the number of students as a proportion based on available information. Characteristics: age group, gender, school achievement, course preference, school English level, home language background, rurality, socio-economic background, attendance type and school-leaver status.

Arts

This course could be described as offering a broad, liberal humanities-based education rather than specific career training. A wide diversity of subjects were offered including those in foreign languages, literature, history, politics, mathematics, physics, philosophy, fine arts, and archaeology.

Students were generally young (70.0% were ≤ 20 years) and had recently left school (68.9%) and 70.0% were women. However there were a relatively high percentage of non-recent school leavers and older students. In comparison to the other six courses, this course had the highest percentage of part-time students and students with an English speaking home background (84%). Part-time students tended to be older ($\chi^2(1, N=1074) = 278.44, p < .001$). A high proportion undertook the higher school English level, although only 56.2% of students had information on this variable. Students resided in areas with moderately high socio-economic ranking (IEdOcc *Mdn*=1127.3). A high proportion of students were from urban areas (94.6%). This course was one of three courses with lower school achievement (TER *Mdn*=86.7). A high percentage of students did not rank the course as their first preference (22.3%).

Commerce

This course was a business/commercial oriented course with subjects including accounting, marketing, finance, economics and government. Students were assumed to have knowledge of basic secondary school mathematics before commencement.

Students tended to be young (78.0% were ≤ 20 years), full-time (96.0%) and urban dwelling (96.5%). Almost two thirds of students were from a non-English speaking home background (63.1%). A high percentage of students had recently left school (82%). Compared to other courses, a high proportion had not

enrolled in their preferred course. The course was allocated first preference by 71.9% of students, and 15.8% took the lower school English level. Residential areas of students were spread relatively evenly between higher and lower socio-economic ranked areas. The median socio-economic index was above the population average (IEdOcc *Mdn*=1084.2). This course was one of four courses with relatively high school achievement (TER *Mdn*=93.1). Although the gender distribution was roughly equal overall, there was a significant interaction between gender and home language background ($\chi^2(1, N=290) = 10.97, p < .001$). Women tended to be from English speaking home backgrounds whereas a higher proportion of men were from community language home backgrounds.

Education

This course combined a background of general education in education, arts, science or economics subjects followed by a program for professional preparation in education.

Students were generally full-time (99.1%), women (87.3%), young (90.0% were ≤ 20 years) and from urban areas (90.0%). A high percentage had recently left school (83.3%), while 88.6% were enrolled in their preferred course. A high proportion of students were from English speaking home backgrounds (79.1%) while 96.5% of students had taken the higher levels of school English. The course was one of the three courses with lower levels of school achievement (TER *Mdn*=78.3) and one of the three courses with lower rankings of the socio-economic index (IedOcc *Mdn*=1056.1).

Engineering

This course consisted of science-based curricula in the early years, mainly in mathematics, physics, chemistry and computer science, followed by specialisation in the later years. The program covers scientific fundamental and

engineering applications in fields of telecommunications, computer systems, control and automation, electrical power systems and electronics. Students were assumed to have knowledge in mathematics and science subjects before commencing.

Students were all full-time, mainly men (87.8%), young (90.5% were ≤ 20 years), and 99.3% were recent school leavers. Students were mainly from urban areas (96.9%) and from areas with a socio-economic ranking above the population median (IEdOcc *Mdn*=1084.2). Roughly equal proportions of students were from English and community language home backgrounds. The course had the highest proportion on students who took the lower school English level (19.2%) and the highest proportion of students who allocated first preference to the course (88.9%). All enrolled women had given first preference to the course. The course was among the four courses with a relatively high level of school achievement (TER *Mdn* =92.6).

Nursing

This course covered both formal academic and applied clinical study leading to registration within the health services. Students learnt skills in the treatment of disease and injury and in the promotion of health. Knowledge of basic science was assumed before commencement.

A high percentage of women (81.9%) commenced the course, approximately one third were over 20 years of age (35.5%). Students were mostly from urban areas (94.3%), attending full-time (98.1%) while a high proportion were not at school recently (36.3%). A high proportion took the higher school English levels (89.2%). For over two thirds of students (67.3%), English was the main language spoken at home. A high proportion of students provided no information on their preferences for the course (64.1%). Among those with

information on course preference, 83.2% were enrolled in their first preference. Most men had given their first preference to the course. This course was among the three courses with relatively low school achievement (TER *Mdn*=58.8) and relatively low socio-economic ranking of student residential areas (IEdOcc *Mdn*=1046.9).

Pharmacy

Also within the health sciences, this course included science and related subjects and provided a broad training in the study of medicinal substances and their application to the management of disease. Knowledge in mathematics and science subjects was assumed before commencing.

Students were mainly full-time (94.1%) with high percentage of recent school leavers (90.3%). Almost two thirds were women (61.9%) and 83.3% were 20 years of age or less. There was a high proportion of students from non-English speaking backgrounds (72.4%) and compared to other courses, a high proportion of students who took the lower school English level (18.2%). For all the students in the older age group, English was not the main language spoken at home. Almost a third of students did not allocate first preference to the course (30.2%). A large percentage of students were from urban residential areas (93.9%). This course was among the three courses with relatively low socio-economic ranking of student areas of residence (IEdOcc *Mdn*=1004.2). The course is one of the four courses with relatively high levels of school achievement (TER *Mdn*= 95.2).

Veterinary Science

This course included basic science subjects and related subjects providing a broad training in the maintenance of health and the prevention and treatment of disease and injury in animals. Knowledge in mathematics and science subjects was assumed before commencement.

Commencing students in this course were the most homogeneous group in terms of the selected characteristics and demographics. With a high proportion of women (58.3%), full-time (90.3%), young students (84.7% were ≤ 20 years) and recent school leavers (90.48%), this course had the highest percentage of students from rural areas compared to the other courses (11.8%). There was a higher proportion of men in the older age group. This course had the highest proportion of students with higher school English levels (91.1%). Approximately 81% of students were from an English speaking home background and 87.7% of students were in their preferred course. Among those students who come from a community language home background, there was a higher proportion of men than women, with a significant interaction indicated between gender and home language background ($\chi^2(1, N=72) = 6.33, p < .01$). The course was among four courses with relatively high levels of school achievement (TER *Mdn* = 97.9). The socio-economic index presented a mid-range ranking (IEDOCC *Mdn* = 1095.3).

These results highlight differences across learning contexts at the commencement of each course, differences in subjects and focus and in the distribution of background characteristics and demographics of students within these courses.

CHAPTER 8

PATHWAY CHOICES

Pathways of progression were modelled as a function of academic choices of enrolment over time. The formation and structure of a single variable representing individual longitudinal pathways of progression over a number of years at the student level was devised by Robinson (2004)(Appendix A1). This method involved tracking each student within their course over eight years from their initial course enrolment. Student enrolment and completion status were examined at the beginning of each year and at the end of each year. Each student was assigned a code for each successive year, each code indicating a stage in their course and the corresponding enrolment status for the year. Each student's enrolment and completion status over eight calendar years was represented by a series of eight codes. These codes were then concatenated into a single pattern representing a longitudinal pathway of progression at the individual student level of data. Longitudinal pathway patterns indicated yearly enrolment, withdrawal, stop-out, course transfer or course completion for each student. A condensed version of the process of constructing pathway patterns described in Appendix A1 is outlined in Figure 8.1. Further details on the structure of these patterns in the present research are presented in Appendix C.

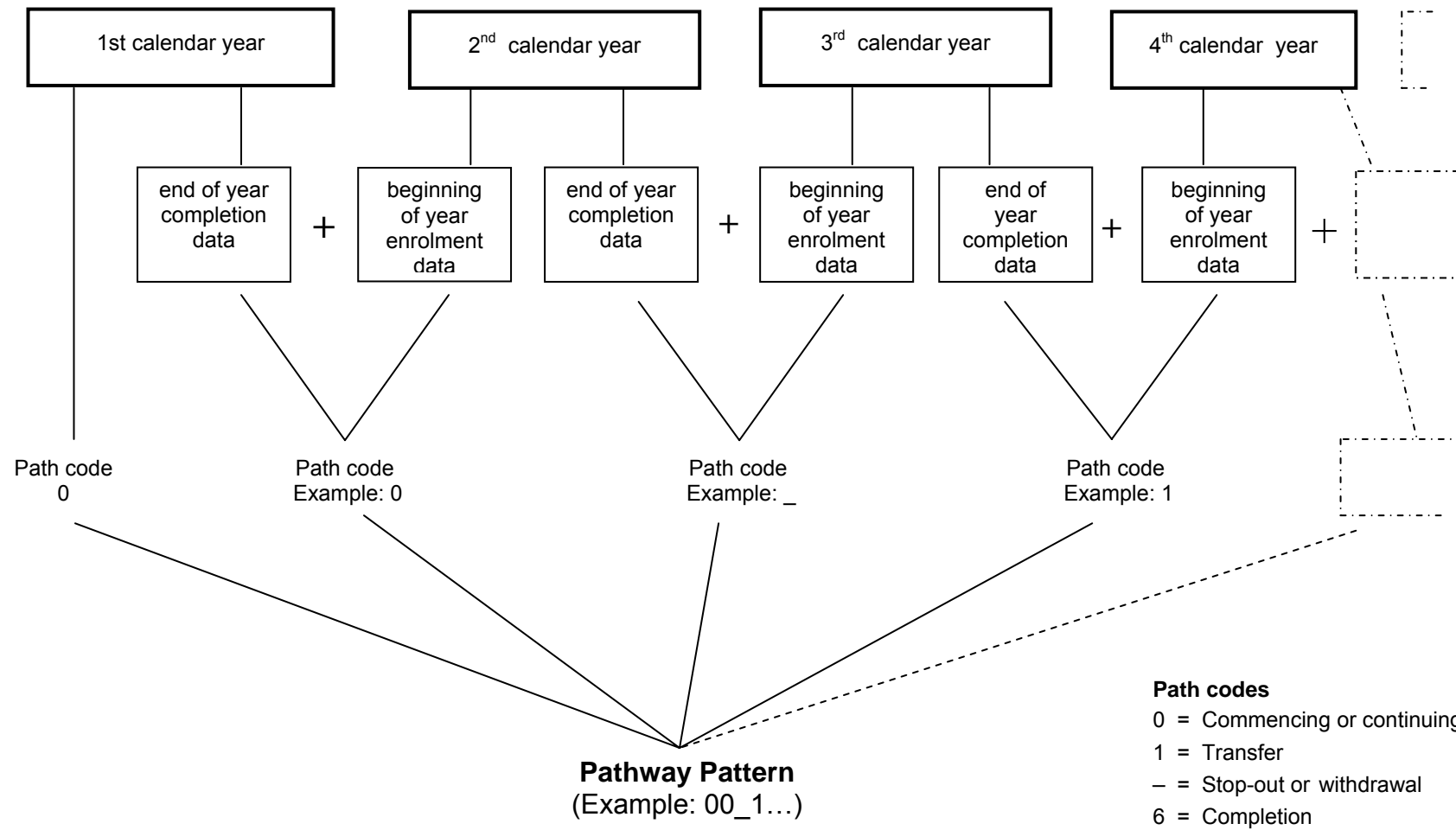


Figure 8.1. Pathway patterns derived from unit of study enrolment data and completion data

Patterns of progression through university

A frequency distribution of the pathway variable indicated the various pathways of progression over time. The extent to which pathways through university were characterised by enrolment, withdrawal, stop-out and transfer, was indicated by the distribution of these pathway patterns. Table C2.1 (Appendix C) presents this analysis for all students in the combined courses.

Results indicated there were diverse patterns of progression through university, 134 different pathways in total. Overall, the majority of students enrolled in consecutive years until completion (59.4%). Seven students were still enrolled at the end of the research (0.3%). However there was a substantial percentage of students who did not take an uninterrupted path through their course. Table C2.2 indicated that for each year following course entry, there were a number of students who did not complete but who chose not to re-enrol. Pathway patterns show that overall there were 40.3% of students who left their course at some stage prior to completion, either temporarily or permanently. Table 8.1 indicated that at some stage during the course, 31.9% of students left, either temporarily (4.7%) or permanently (27.2%), and 8.4% transferred to another course, with some returning (2.1%) and others not (6.4%). Results also indicated that of the 40.3% of students who left their course at some stage, 16.8% of this group or 6.8% of total students, returned at a later stage to their course. A number of students did not remain within the course when they returned following a stop-out or a transfer (Table C2.1).

Diverse pathways of progression through university, characterised at different stages following course entry by withdrawal, stop-out and transfer to other courses, indicated the range of academic choices taken by students over the years following course entry.

Table 8.1

Frequency and Percentage of Types of Pathway Choices by Course

Course		A	B	C	D	E	F	G	Total
Continuous enrolment	N	539	220	68	61	220	149	49	1306
	%	50.19	73.33	61.82	41.22	69.84	88.69	68.06	59.72
Withdrawal	N	400	45	29	24	76	14	6	594
	%	37.24	15.00	26.36	16.22	24.13	8.33	8.33	27.16
Stop-out	N	65	5	6	3	13	2	9	103
	%	6.05	1.67	5.45	2.03	4.13	1.19	12.50	4.71
Transfer	N	63	28	7	33	6	2	0	139
	%	5.87	9.33	6.36	22.30	1.90	1.19	0.00	6.36
Transfer and return	N	7	2	0	27	0	1	8	45
	%	0.65	0.67	0.00	18.24	0.00	0.60	11.11	2.06
TOTAL	N	1074	300	110	148	315	168	72	2187
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note. Percentages represent column percentages within course

Courses: A=Arts, B=Commerce, C=Education, D=Engineering, E=Nursing, F=Pharmacy, G=Veterinary Science

Choice: 'continuous enrolment' includes both completions and non-completions

Pathways of progression within learning contexts

For each year following course entry, the number of enrolled students varied and consequently the numbers of students following different progression pathways. Variation in the frequency of enrolment across courses in each calendar year following commencement is presented in Table C2.3. To investigate the range of pathways within different learning contexts, frequencies and percentages of the patterns of progression were analysed within courses (Table C2.4.1-Table C2.4.2).

A diversity of pathways of progression was indicated across learning contexts. Students varied, both across courses and across the years following commencement, in the year chosen to first leave their course and in the timing of their decision to return at a later stage. Table 8.1 shows across courses, this variation in the choice to withdraw, stop-out or transfer. The transfer choices in Engineering and Veterinary Science reflect the alternative course pathways which incorporate additional courses offered to the better students. Continuous progression following course entry, the most common pattern of progression within all courses, varied from 41.2% in the Engineering course to 88.7% in the Pharmacy course. Other enrolment options varied across courses, as well as across time from the point of course entry (Table C2.2).

Figure 8.2 illustrates within courses, the proportion of various enrolment choices in each year following the year of course entry.

Results indicated a diversity of pathways or patterns of progression, both within and across courses.

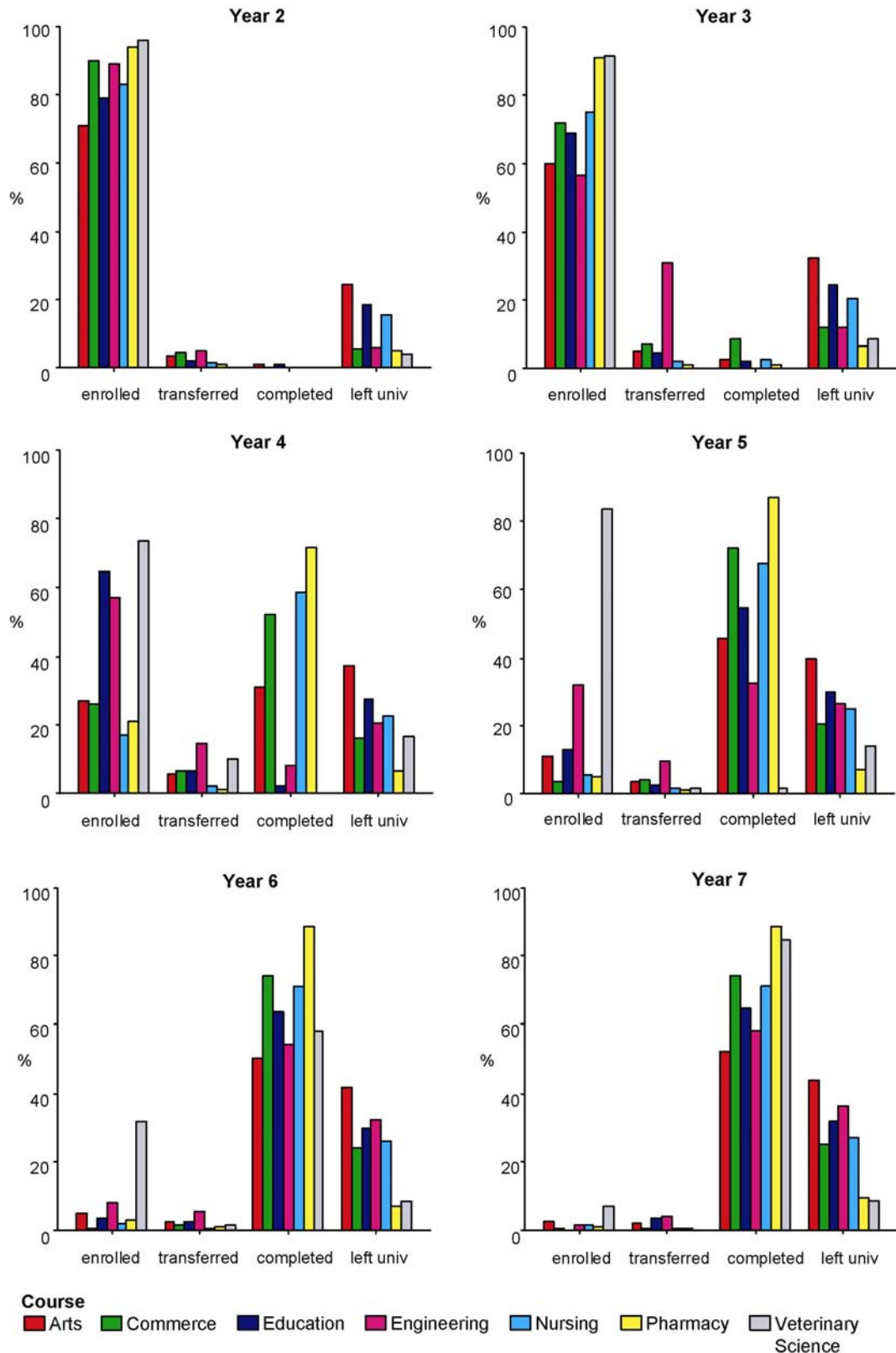


Figure 8.2. Percentage distributions of enrolment choices by course for each calendar year following the year of course entry. Percentages are calculated within courses.

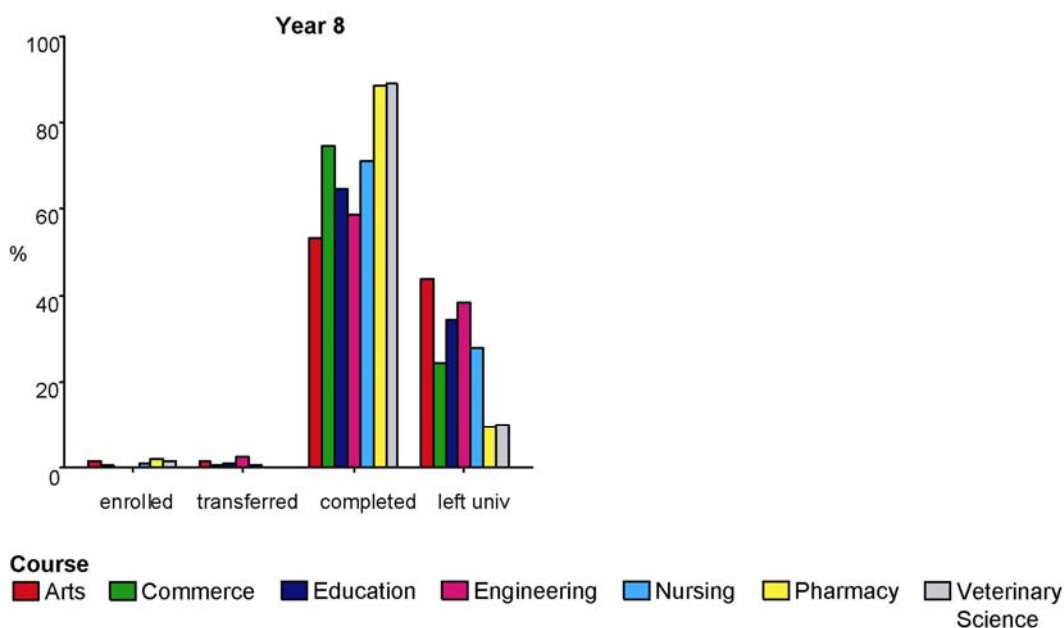


Figure 8.2 (continued). Percentage distributions of enrolment choices by course for each calendar year following the year of course entry. Percentages are calculated within courses.

Background characteristics within courses over time

To investigate the range of background characteristics and demographics within each course over time, the frequency and percentage distributions of each characteristic and demographic were analysed at each course stage. Table C2.3 illustrates the gradual change in the number and percentage of students enrolled in each course over the years, as some students withdrew or completed their course.

Changes across time in the profiles of characteristics and demographics within courses, are illustrated by changes in the distribution of characteristics at each stage following course entry. Changes in profiles are presented in terms of stages of sequential calendar years following from the year of course entry (1994) and also in terms of stages of consecutive years of actual enrolment within a course. The first approach presents the context, the characteristics within courses, in terms of those students enrolled in each sequential calendar year (Tables B1.1-B1.10 and Figures B1.1-B1.10). This approach allowed for comparison between

those students enrolled and those who have transferred, withdrawn or completed in a specific calendar year. The second approach presented the context experienced by each student in each sequential year in which they were enrolled in a course (Tables B4.1-B4.10 and Figures B4.1-B4.10). This approach described the context in terms of the sequential stages in the academic progression of students. The profiles of characteristics and demographics presented at Year 1 in the two approaches are slightly different. Tables B1.1-B1.10 (Figures B1.1-B1.10) present the profiles at course entry while Tables B4.1-B4.10 (Figures B4.1-B4.10) present profiles of those who undertook assessment at the end of the first year.

A description of these two approaches to recording student data has been described in Appendix A6. Table C3.1 illustrates for each course the mismatch between recording stages of progression outcomes with student data in sequential calendar years rather than in years of actual enrolment.

Course contexts at the point of course entry have been described for each course in Chapter 7. The following sections describe subsequent changes in these learning contexts over time in terms of student background characteristics and demographics.

Arts

Across the second and third sequential years of enrolment, the proportion of students with higher school achievement increased. The proportion of men decreased at these stages. With a gradual increase in the proportion of recent school leavers, the proportion of students who were older and part-time declined. At this stage the proportion of students from community language home backgrounds increased. Following the third year, the proportion of students with higher levels of school achievement decreased. This is the stage at which students who have completed the course in the minimum time would have left. At this

stage there was an increase in the number of men, in students who had *not* recently left school when they commenced, in older students and part-time students, as well as students from areas with higher socio-economic indices. However there were fewer students from community language home backgrounds at this stage. From the sixth to the eighth year of enrolment, there was an increase in students who were not in their preferred course and students who took the lower English level at school. The seventh to eighth years showed an increase in students with higher school achievement, possibly explained by those returning following transfer to other courses. Following the sixth year, there were no students from rural areas enrolled.

In terms of sequential calendar years, the proportions of student background characteristics and demographics changed in similar patterns to years of actual enrolment. There were increasing proportions of students who were not in the course to which they allocated their first preference, students with a lower school English level, students from areas with higher socio-economic indices and students who, at course entry, had not been at school recently.

Commerce

Following the second academic year, the proportions of older students and students who had not left school recently, began to decrease. There was an increase in the proportion of students with higher school achievement in the third academic year. Following the minimum time for course completion, there were fewer students from the older age group, less from lower socio-economic backgrounds, and fewer with a lower school English level. There was also a slight reduction in the percentage of non-first course preferences. However, at this stage there was an increase in the proportion of part-time students, an increase in women and in students with community language home backgrounds.

In terms of sequential calendar years, the pattern is similar to years of actual enrolment with an increase in younger students, in women and in students with lower school English levels and students for whom the course was their first preference. Amongst those enrolled, there was also an increase in the proportion of students from community language home backgrounds, in those with lower school achievement levels and students from areas with lower socio-economic indices.

Education

Over the first four years of enrolment, there was a decline in the proportion of men, of older students and students from rural areas. Over the same time there was an increase in students who at course entry, had recently left school as well as students from lower socio-economic areas. Amongst those enrolled for a fifth academic year, the year following minimum completion time, the profile changed. There was an increase in non-recent school leavers, in older students and in students from community language home backgrounds, in students not in their preferred course and in students from higher socio-economic areas. At this stage, all remaining students were from urban areas.

In terms of calendar years, a similar pattern of characteristics and demographics was indicated. The decrease in non-first preference enrolments following first year together with fewer men and fewer older students, changed following the third calendar year to an increase in first course preference enrolments, an increase in men, in students from community language home backgrounds, in older students and students who had not left school recently when they commenced the course.

Engineering

The school achievement level among students was high at course entry. In

the sequential academic years up to the fourth year, there was a gradual decrease in the level of school achievement. In the fourth academic year there was an increase in the proportion with low school English levels and a decrease in numbers of rural students. The balance of students from English speaking and community language home backgrounds remained stable over the years. Following the minimum time for completion, there was an increase in higher school achievement levels together with an increase in the proportion of students from areas with higher socio-economic indices. There was also enrolled at this stage a higher proportion of students from community language home backgrounds and more with a lower school English level. This was accompanied by an increase in the proportion of students who were not enrolled in their preferred course.

In terms of calendar years, there was a decrease in school achievement level over the years and an increase in the proportion with lower levels of school English. In the third year there was an increase in the proportion of students from community language home backgrounds, followed by an increase over the following years in students from English speaking home backgrounds. In these later years, there was an increase in students who were not in their preferred course together with a decrease in women and older students.

Nursing

Over the two academic years following the commencing year, there were fewer men. There were an increasing proportion of students from lower socio-economic areas. Following the minimum time to completion, there were fewer rural students, more students with a lower school English level and more from lower socio-economic areas. Although the majority had an English speaking home background, there was an increase in students from community language home

background. There was an increase in the proportion of students at these stages who were enrolled in their preferred course and an increase in the proportion of men.

In terms of calendar years, the early years have higher proportions of students from English speaking home backgrounds and students from areas with lower socio-economic indices. Following the fourth year, there was an increase in men, in the proportion of students who were older, in the proportion of students who were in their preferred course, in those who had lower school English levels and those students who were from areas with lower socio-economic ranking.

Pharmacy

Following enrolment in a third academic year, the minimum time for completion, profiles of student characteristics and demographics changed. There was an increase in the proportion of men, of students from community language home backgrounds, of students who were not in their preferred course, who were older students, and students with lower school English levels. There were no rural students enrolled in these later years. The profile of characteristics and demographics over calendar years in Pharmacy followed a similar pattern.

Veterinary Science

Following the minimum completion time, there was an increase in the proportion of men and the proportion of students from community language home backgrounds. There was an increase in the proportion of students who were not enrolled in their preferred course, who had lower school English levels and who were older. There was a slight increase in students from urban areas and from areas with a higher socio-economic ranking.

In terms of calendar years, the proportions of students from urban areas and areas with higher socio-economic ranking, showed similar increases. There

was a gradual decrease in men over the eight years.

Results highlighted the diversity in these student background characteristics and demographics both across each course and at each subsequent stage of a course. There was a dramatic change in profiles of characteristics and demographics in each course following the minimum time for course completion as increasing numbers of students completed.

Overall, the diversity of pathways of progression, both within and across courses indicated a range of academic choices taken by students over time. Students with diverse background characteristics and demographics were enrolled in the different undergraduate courses. The profiles of characteristics and demographics of enrolled students within each course changed in varying degrees over the years, a consequence of the diversity of academic enrolment choices of students within courses over time. The totality of changing curricula, teaching and general milieu of each course over time, the changing and diverse background characteristics and demographics of enrolled students at each stage as a consequence of diverse pathway choices, combine to present a number of learning contexts which illustrated diversity both within stages and across stages over time.

CHAPTER 9

ACADEMIC PERFORMANCE

This chapter reports the analyses and results of an investigation into the association between performance outcomes, student characteristics and demographics and the learning contexts of courses over time. Models of performance outcomes specific to the learning context of each course and to each stage of course enrolment were examined. In each course and in each year, examining the prediction of academic performance from the characteristics of students revealed the degree of interaction between performance outcomes, personal characteristics and the learning context over the years of enrolment.

Analysis and Results

Student data on performance outcomes was arranged in the form DATA B described in Appendix A6. Analyses were undertaken within the three student groups, FT-RSL, FT-NRSL and PT (RSL and NRSL).

A student's academic performance outcome (SPU) for each year of actual enrolment was reduced to a binary categorical variable, representing either passing or not passing all UOS at the end of each year of enrolment. The predictor variables, the background characteristics and demographics of students, together with the variables representing performance outcomes are detailed in Appendix A5. Student characteristics included the following: school achievement, school English level, home language background, gender, course preference, three age groups (young, middle, older), rural or urban area of residence and socio-economic background.

A brief exploratory analysis of first year outcomes examined the appropriateness of a single *general* model of outcomes within the broader context

of the combined courses, as opposed to models *specific* to more immediate course contexts.

The appropriateness of a *general* model was assessed using the single level modelling procedure of logistic regression. Each course was represented by a dummy variable. For each course, the mean predicted probability of a successful performance outcome was examined. If a general model of performance was appropriate, then the mean predicted probability for a successful performance outcome would be similar across all courses. If the mean predicted probabilities of success varied across courses, then alternative models within the specific learning contexts of each course would need to be investigated. In principle, diverse models mean these contexts are not comparable.

In examining the appropriateness of *specific* models, direct comparisons were not appropriate between courses. The questions concerned the prediction of academic performance outcomes from student characteristics within the *specific* contexts of each course. Logistic regression analyses were undertaken separately within each course at each stage of progression.

Appendix D1 presents the frequencies and percentages of performance outcomes, for each year of each course and for each of the three groups defined by attendance type and school leaver status. Appendix D2 presents the inter-correlations between performance outcomes and student characteristics for the same sub groups. School-related variables were not available for students who had not recently attended school.

Performance within a general context

Analysis

Appendix D3 presents an initial exploratory analysis into the prediction of

academic performance at the end of first year from student background characteristics and demographics at course entry. This brief exploratory analysis investigated the appropriateness of a *general* model of performance within the context of all courses combined. The purpose was to examine the appropriateness of models of prediction as *general* models of performance outcomes applicable to any course. The details of results of each logistic regression analyses are reported in Appendix D3.

Results

Results indicated the mean predicted probabilities of performance success for each of the seven courses, covered a wide range of probabilities of first year success across different courses, for each set of predictor variables. This range of differences suggested predictors acted differently across course groups. The outcome suggested that, with the given predictors, a *general* model of performance consistent across all courses was not appropriate for the first year of enrolment. It was assumed the years of enrolment following first year for these groups of students would not be different in this respect. The relationship between academic performance and the background characteristics and demographics of students may be better understood in terms of models pertinent to the more specific learning contexts of courses and years of enrolment. Preliminary results justified further investigation within the specific contexts of each course.

The following section presents models and predictors of annual performance outcomes across the years within the context of each *specific* course.

Performance within specific course contexts

Analysis

Within the specific learning contexts of courses, the following analyses

investigated the prediction of academic performance from student background characteristics and demographics. Each of the seven courses, at each stage of enrolment following course entry, represented the range of specific learning contexts investigated. All students who had chosen the pathway to enrolling in a specific year, and had undertaken course assessment for that year, were included. Student choice and time were as a result held constant for each analysis within each course. Performance data was taken at specific stages of actual course enrolment rather than in consecutive calendar years following course entry. The following analyses are presented in greater depth than the previous exploratory analyses as their purpose was different.

For each year of enrolment within each course, logistic regression analyses were used to predict successful annual performance from each of the selected student background characteristics and demographics noted at course entry. Initially a preliminary series of crude logistic regression models were fitted to the data using each student characteristic or demographic as a single predictor of successful performance outcome (that is, passing all UOS). Potential covariates were ignored at this stage. In order to find the best combination of two or more predictors to maximise the likelihood of obtaining the observed performance outcome, a series of sequential logistic regressions followed where appropriate. Potential covariates were incorporated into the model in sequence in order to find the best model for the context. Improvement in the model at each stage of the analysis was assessed by comparing the observed frequencies with the frequencies predicted by the model using a goodness-of-fit χ^2 process. In addition, the contribution of each individual predictor to the prediction of performance was assessed by the Wald statistic and the odds ratio.

To enable more specific age descriptions, the variable for age was divided into three separate variables representing the young, middle and older age groups (see Table A5.4). With a lower frequency of enrolment in later years, logistic regression analyses were confined to the years within the nominal duration of each course. For example, analyses within the four year Engineering course were undertaken over the first four years of each student's actual enrolment. These were not necessarily consecutive calendar years of enrolment for each student. Separate analyses were undertaken within each of the three student groups, and for each of the eight background characteristics, within specific contexts defined by each of the seven courses, at each stage of progression.

Results

Results are reported for each of the three student groups within each course. A summary of results of the initial analyses using single predictors, within courses and year of enrolment, are presented in Tables 9.3.1-9.3.3. A summary of results of significant adjusted models with more than one predictor is presented in Tables 9.3.4-9.3.5. Tables 9.3.1-9.3.5 present the logit coefficient (B) and SE for each predictor variable, significance of the Wald statistic and comments on the number of cases in the analyses. Each Wald statistic $(B/SE)^2$ and odds ratio (e^B) can be derived from information presented in each of the tables.

Arts

Amongst the full-time students at the commencement of the course, 78.0% were RSL. While most of these were full-time (97.2%), the NRSL were more evenly divided with only 56.4% full-time and 43.6% part-time.

Full-time Recent School Leavers

Year 1

Initial models using single predictor variables

The results of the logistic regression analyses using single variable predictors of performance in Year 1 are presented in Table 9.3.1. Model chi-squares were significant for models with school achievement, with school English level and with gender as single predictors. The odds ratios suggested that the estimated odds of successfully passing first year are 50% higher for women than men (OR=1.50). For students who took higher levels of school English, the probability of passing was 6.8 times higher compared to students who took the lower school English level (OR=6.75). Using school achievement as a predictor, suggested the probability of passing was 1.1 times higher for every unit increase in TER performance (OR=1.11).

Adjusted models with more than one predictor variable

With gender, school achievement and school English levels all significant as single predictors of first year performance, correlations indicated gender was not significantly correlated either with school achievement or with higher school English levels (Table D2.1.1.1/Appendix D). However, school achievement was significantly correlated with school English level.

A series of sequential logistic regressions were performed with school achievement, school English level and gender as predictor variables. The model with school achievement as the only predictor was significantly different from the constant-only model. A comparison of the log-likelihood ratios of the model (Model: school achievement, school English) against the model (Model: school achievement) showed a reliable improvement. However, a comparison of the model with gender added (Model: school achievement, school English, gender) to

the two-factor model did not indicate any significant improvement above the two-factor model. A test of the full two-factor model (Model: school achievement, school English) against the constant-only model was statistically reliable indicating that the predictors, as a group, could reliably distinguish between those students who passed all UOS and those who did not among FT-RSL in Year 1 in the Arts course. Table 9.3.4 reports the contribution of significant individual predictors, the logit coefficient and standard error for each variable. According to the Wald criterion, both school achievement and higher levels of school English predicted success in Year 1. The contribution of gender as a predictor in combination with school achievement and English level was non-significant. For each unit increase in TER, the odds of successfully passing Year 1 increases by 11% assuming that the level of school English is held constant (OR=1.11). The odds for successful performance in Year 1 is about 4 times greater in the higher school English group than in the lower school English group, assuming the TER is held constant (OR=4.37). The effect of school English levels, adjusting for school achievement, is not quite as large as the crude odds ratio but it is still large and significant. For the two predictor model, the prediction of success was based on probability criterion of .05 and was correct for 84.1% of students who passed and 33.5% for those who did not pass all UOS in Year 1. The overall percentage of successful classification of students was 64.7%. One case was poorly predicted by the solution (studentised residual >2). The Hosmer and Lemeshow test for the difference between the observed and expected frequencies for the model was non-significant.

In summary, higher school achievement and the higher levels of school English was the best combination of predictors to maximise the likelihood of

passing all attempted UOS at the end of the first year of enrolment in Arts.

Year 2

Initial models using single predictor variables

The results of the logistic regression analyses using single variable predictors of performance in Year 2 is presented in Table 9.3.1. Results indicated gender, school achievement, school English levels, English home background and age was each important in the prediction of performance in Year 2 for FT-RSL. Results suggested that the estimated odds of successfully passing Year 2 were 60% higher for women than men. For students who had taken higher levels of school English, the probability of passing was 3.11 times higher compared to students who had taken the lower school English level (OR=3.11). Using school achievement as a predictor, the probability of passing was 1.07 times higher for every unit increase in TER indicating a small but significant effect (OR=1.07). For those with English as the home language, the probability of passing Year 2 was 59% higher than for those students from a community language home background (OR=1.59). The probability of passing was 2.44 times higher for younger students under 20 years of age than for older students (OR=2.45). Table D2.1.2.1 indicates gender was not significantly correlated with other significant predictors. However school achievement, home language background and school English level were significantly inter-correlated. However, school English level was significantly correlated both with English-speaking home background and with school achievement. Being in the younger age group was significantly correlated with school English levels and an English home language background.

Adjusted models with more than one predictor variable into the model

Following an examination of correlations and single predictors of Year 2 performance, a sequential logistic regression was run using gender and school

English level as predictors. Results indicated gender and school English level were significant predictors of successful performance in Year 2 (Table 9.3.4). A test of the full two-factor model (Model: gender, school English) against the constant-only model was statistically reliable indicating that the predictors together could reliably distinguish between those students who passed all UOS and those who did not. The odds ratios suggested the chance of passing Year 2 was 1.83 times higher for women than men assuming that the level of school English was held constant. The odds ratio for school English level (OR=3.54) indicated the odds for success performance in Year 1 was about 3.5 times greater for those in the higher school English group than those in the lower school English level group with gender held constant.

Year 3

Initial models using single predictor variables

The results of the logistic regression analyses using single variable predictors of performance in Year 3 are presented in Table 9.3.1. Apart from gender, correlations between student characteristics and performance outcome in Year 3 were not significant. Together with reduced numbers and limited variability of characteristics in this enrolment year, further analysis to locate adjusted models with more than one predictor variable was not undertaken.

The model with gender as the only predictor was significantly different from the constant-only model ($\chi^2(1, N=467) = 4.168, p < .04$). The estimated odds of successfully passing Year 3 were 65% higher for women than men. The overall percentage of successful classification using this model was 78.4%. Gender remained the best single predictor of performance among FT-RSL in Year 3.

Full-time Non-Recent School Leavers

With lower student numbers among FT-NRSL, logistic regression

analyses were limited to single predictor models.

Year 1

Of the 184 FT-NRSL enrolled in Year 1 Arts, only 74.7% of those with an SPU score passed all UOS in Year 1. Correlations between student characteristics and performance outcomes in Year 1 were not significant (Table D2.2.1.1). However, a chi-square analysis between the three age groups and Year 1 performance outcome was significant and indicated the patterns of observed frequencies were not consistent across the three age groups against performance outcome ($\chi^2 (2, N=178) = 7.45, p<.02$). However, there was a significant association between being in the older age group and successful performance ($r_s = .18, p<.01, N=184$).

Logistic regression was performed using the older age group as a single predictor of performance in Year 1. Results indicated for those FT-NRSL students 25 years of age and over, the chance of success in Year 1 was more than twice that for younger students (OR=2.54). With the final model significantly different from the constant-only model ($\chi^2 (1, N=178) = 6.27, p<.01$), results indicated that being in the older age group was a significant predictor of Year 1 success (Table 9.3.2).

Year 2-3

Amongst FT-NRSL students with performance outcome scores in Year 2, 81.7% passed all UOS. In Year 3, 81.2% passed all UOS. There are no significant correlations between any of the independent variables and performance in Year 2 (Table D2.2.2.1). Cross-tabulations of student characteristics by performance outcome for Year 2 and Year 3 indicated frequencies were too low for reliable logistic regression analyses.

Part-time students (RSL and NRSL)

Year 1

There were 17 PT-RSL and 131 PT-NRSL students assessed in Year 1.

Initial models using single predictor variables

A series of logistic regression analyses were run to predict successful performance using student characteristics as single predictor variables (Table 9.3.3). When using gender as the single predictor variable, the model χ^2 indicated a significant difference between the final model and the constant-only model ($\chi^2(1, N=148) = 8.09, p < .001$). The Wald statistic was also significant with the odds ratio suggesting that the chance of success was 3.6 times greater for women than for men (OR=3.58).

Age was another significant predictor of successful Year 1 outcome for part-time students. Being in the older age group predicted successful performance for part-time students in Year 1. The odds ratio suggested the chance of a successful performance outcome for students 25 years of age and over was 3.5 times higher than for younger students (OR=3.52).

Adjusted models with more than one predictor variable

A sequential logistic regression using both gender and the older age group as independent variables found both variables were significant predictors of success (Table 9.3.5). A test of the full two-factor model (gender, age-older) against the constant-only model was statistically reliable indicating that the predictors together could reliably distinguish between those students who passed all UOS and those who did not. The odds ratios suggested the chance of passing Year 1 as a part-time student was 3.2 times higher for women than men assuming that age was held constant (OR=3.22). The chance of successful performance in Year 1 was also about 3.2 times greater in the older age group than in the younger

group, with gender held constant (OR=3.16).

Year 2

There were 93 part-time students with performance outcomes in Year 2. There were significant correlations between performance success and being an older student, and performance success and being a woman, among part-time students (Table D2.3.2).

Initial models using single predictor variables

Gender and age were significant single predictors of a successful Year 1 outcome (Table 9.3.3). However, the predicting age group was wider than that in Year 1. The older age group was a significant predictor of Year 2 success among part-time students. Reversing the parameter coding to variable 'age_y' indicated the chance of success for part-time students over 20 years was approximately six times that of the younger group (OR=6.25).

Adjusted models with more than one predictor variable

A sequential logistic regression was performed with gender and the older age group as predictors. The two-factor model (Model: gender, 'age_o') was not significantly different from the gender-only model. Gender remained the best single factor predictor of performance success in Year 2 for part-time students. The odds ratio of the single-factor model (OR=5.23), suggested the chance of passing Year 2 as a part-time student was 5.2 times higher for women than men (Table 9.3.5).

Year 3

There were 73 part-time students with performance outcomes in Year 3. Correlations indicated age as the only characteristic significantly correlated with performance outcome among part-time students in Year 3 (Table D2.3.3).

Initial models using single predictor variables

The results of the logistic regression analyses using single variable

predictors of performance in Year 3 is presented in Table 9.3.3. The estimated odds of successfully passing Year 3 were approximately 10 times higher for older part-time students than for students under 25 years (OR=9.9). The model was significantly different from the constant-only model and 82.2% were classified correctly by the model.

Commerce

Of the total 300 students who commenced the Commerce course, 96% attended full-time.

Full-time Recent School Leavers

Year 1

Of the FT-RSL students, 99.7% had a score on Year 1 performance. Of these students, 94.12% were 20 years of age or less.

Initial models using single predictor variables

A series of crude logistic regression models were fitted to the data using each single independent variable as a predictor of performance outcome in Year 1. Results of these analyses are presented in Table 9.3.1. The best single-factor models for predicting performance in Year 1 included each of the characteristics, home language background, school achievement and school English level as significant predictors. Odds ratios indicated firstly, those students with English as the home language were twice as likely to succeed in Year 1 compared to those with a community language home background (OR=2.08). Secondly, those students who took higher levels of school English were 3.35 times more likely to succeed in Year 1 than those who took the lower school English level (OR=3.35). Thirdly, for each unit increase in TER, students are 15% more likely to pass all UOS (OR=1.15). However, these three variables were significantly correlated

(Table D2.1.1.2).

Adjusted models with more than one predictor variable

Sequential logistic regressions were performed firstly with school achievement and school English levels, and secondly with school achievement and English home language background as predictors of performance success. The addition of school English level and of home language background to school achievement in both analyses, did not produce models significantly different to the single-factor models using school achievement only. English home language background was the strongest single predictor of successful performance in Year 1 for FT-RSL students (Table 9.3.1).

Year 2

Of the 173 FT-RSL students in Year 2, 56.7% passed all UOS (Table D1.2).

Initial models using single predictor variables

Frequencies were low for reliable logistic regression analyses for some predictor variables. Significant single predictors of successful Year 2 performance included being 20 years of age or less (OR=6.55), higher school English levels (OR=3.84) and higher school achievement (OR=1.34) (Table 9.3.1). Although the model using socio-economic background as predictor was significant, the odds of passing were low and the log likelihood estimates indicated this model was not strong. School achievement and socio-economic background were significantly correlated (Table D2.1.2.2).

Among FT-RSL in Year 2, 93.6% were aged 20 years and under, and 84.6% were candidates for higher school English levels. Being in the young age group is significantly correlated with higher school achievement, with higher school English level and with successful performance. For the model using the

young age group as predictor, the odds ratio indicated a probability 6.6 times higher of passing all UOS for students under 20 years compared to older students. The model correctly classified 60.7% of students (Table 9.3.1).

Adjusted models with more than one predictor variable

A sequential logistic regression adding school English level to school achievement as predictor variables was not significantly different from the model using school achievement alone. Both higher school achievement and higher school English levels were positively correlated with successful performance (Table D2.1.2.2). Frequencies were too low for further analyses.

Year 3

Initial models using single predictor variables

Of the 161 FT-RSL students who enrolled in Year 3, 73.9% passed all UOS. While frequencies were low for some characteristics, a series of logistic regression models were fitted to the data using the remaining variables as single predictors of performance outcome (Table 9.3.1).

Using school achievement as a predictor, the probability of passing was 1.16 times higher for every unit increase in TER, indicating a small but significant effect. The probability of passing was 4.8 times higher for younger students under 20 years of age than for older students (OR=4.79). The log likelihood estimate was significant however, suggesting this was not a strong model. For the model using school achievement as predictor, 77.2% of students were correctly classified. While using the model with age as a predictor, 75.2% were correctly classified. Logistic regression analyses using more than one predictor were not undertaken. Table 9.3.1 presents the results.

Full-time Non-Recent School Leavers

With a lower number of FT-NRSL students, logistic regression analyses

were limited to single predictor models.

Year 1

Almost half of FT-NRSL students were over 20 years of age, 64.9% were men, and 61.1% came from community language home backgrounds. Although 92.0% of students were from urban residential areas and evenly distributed across different socio-economic backgrounds, almost a third had no information on the socio-economic background of their residential area.

The results of the logistic regression analyses using single variable predictors of performance are presented in Table 9.3.2. Using the younger age group as a single predictor, the model was significantly different from the constant-only model and correctly classified 70.3% of students. The odds ratio suggested that a FT-NRSL student was 5.7 times more likely to succeed if they were 20 years or less than if they were older. Of those assessed in Year 1, 54.1% failed at least one UOS. Of those who failed, 70.0% were over 20 years of age. The correlation between performance and age was significant indicating a positive association between younger ages and success in Year 1 (Table D2.2.1.2). Of those who failed, English was not the home language for 73.7% of students. There was a significant association between English home language background and being younger.

Year 2

Of the 33 FT-NRSL in Year 2, 36.4% failed at least one UOS (Table D1.3). Logistic regression models fitted to the data using student characteristics as single predictor variables of performance outcome did not produce any significant models for predicting Year 2 performance (Table 9.3.2).

Year 3

Of the 24 FT-NRSL in Year 3, 75% of students passed all UOS (Table

D1.3). Correlations showed no significant associations between performance and any of the student background characteristics (Table D2.2.3.2). The small number of FT-NRSL students in Year 3 precluded any further logistic regression analyses.

Part-time students (RSL and NRSL)

Only 4% of all 300 commencing students were part-time. Only six part-time students reached their third year in Commerce.

Year 1-3

Of the eight part-time students with performance scores in Year 1, only two students passed all UOS (Table D1.4). Only one out of five students passed Year 2 while two out of four passed Year 3 as part-time students in Commerce.

Education

There were 110 students who commenced the course and most students were RSL (82.6%).

Full-time Recent School Leavers

Of the 90 FT-RSL students in Year 1, 87.1% were women. The course was ranked as first preference by 89.3% of enrolling students. English was the home language for 76.5% of students and 96.3% of students took the higher levels of school English.

Performance in Year 1 was significantly correlated with school achievement and with home language background (Table D2.1.1.3). A number of variable frequencies were either low or values were constant in all years among FT-RSL, to support reliable goodness-of-fit tests (Table 9.3.1). All students were 20 years of age or younger.

Year 1

Initial models using single predictor variables

Using school achievement and home language background as single

predictors, models were significantly different from the constant-only model (Table 9.3.1). Wald statistics were significant for the predictors in both models. The odds ratio indicated the chances of success were 2.8 times higher for students with English as the home language than for others (OR=2.82). Using school achievement as a single predictor, the odds of success were 23% higher for each unit increase in TER.

Adjusted models with more than one predictor variable

With no significant correlation between school achievement and English home language background (Table D2.1.1.3) and with single factor logistic regression analyses indicating each as a significant predictor of success, an adjusted sequential logistic regression model was fitted using both variables as predictors (Table 9.3.4). The difference between the constant-only model and the model with home language as predictor was significant. With the addition of school achievement, the two-factor model was also significant as indicated by the goodness-of-fit. The model correctly classified 75.6% of students. The Wald statistics for both variables were significant in the final model indicating a significant contribution of each predictor to the model (Table 9.3.4). The odds ratio indicated the chances of success were four times higher for students with an English home language background than for those without, assuming school achievement was held constant. The odds of success were 24% higher for each unit increase in TER.

Year 2

Of the 74 FT-RSL students with a score for Year 2 performance, 78.4% passed all UOS (Table D1.2). All students were 20 years of age or less. Within an increasingly homogenous group, students were largely urban (91.2%), women (89.2%), with higher school English levels (97.1%), with an English home

language background (78.4%) and lower school achievement (90% with TER below the median). The correlation between Year 2 performance and gender indicated a significant association between women and success (Table D2.1.2.3).

Initial models using single predictor variables

Results of analyses using variables representing gender, home language, school achievement and socio-economic background as single predictors of performance in Year 2 are presented in Table 9.3.1. There were no significant models for prediction of Year 2 performance. Although the Wald statistic for the model using gender as predictor suggested the odds of success in Year 2 were significantly higher for women than men (OR=4.5), the model chi-square indicated the model itself did not reach significance when compared to a constant-only model ($\chi^2(1, N=74) = 3.59, p < .06$).

Year 3

Of the 68 students with performance data for their third year of enrolment, 86.8% passed all UOS (Table D1.2). Course preference was the only significant correlation between Year 3 performance and the various background characteristics (Table D2.1.3.3).

Initial models using single predictor variables

Logistic regression analyses were run using the student characteristics, course preference, gender and home language, as single predictors of performance in Year 3 (Table 9.3.1). Using gender and home language background as predictors did not produce significant models. For the model using course preference as a predictor, the model chi-square indicated a significant difference between the constant-only model and the model using course preference as a predictor of success in Year 3 ($\chi^2(1, N=59) = 5.39, p < .02$). The odds ratio indicated the chances of success were 9.6 times higher for those who had

nominated the course as their first preference compared to those who had nominated other courses. However, although 86.4% were classified correctly using this model, these were only students who passed all UOS. Overall the model was not robust.

Year 4

Of the 62 students with scores for performance outcome in Year 4, 93.5% passed all UOS (Table D1.2). Correlations indicated that performance was not significantly correlated with any of the student characteristics (Table D2.1.4.3).

Initial models using single predictor variables

Results of the logistic regression analyses using student characteristics as single variable predictors of performance in Year 4 are presented in Table 9.3.1. As frequencies were either low or values were constant for a number of characteristics, only home language background, socio-economic background and school achievement were used as separate predictors. However, none of the single-factor models for predicting performance was significantly different from the constant-only models (Table 9.3.1).

By Year 4, students were more similar in a number of characteristics than in previous years. All students were young, mainly women (93.5%), in their preferred course (90.6%) and 96.6% had taken higher levels of school English. With the limited variance, these characteristics could not be used as predictors in logistic regression analyses for Year 4.

Full-time Non-Recent School Leavers

Years 1-4

The number of FT-NRSL students in the Education course was low (Table D1.3). Of the 17 students with performance scores in Year 1, 75.0% passed all UOS. Table D1.3 presents the frequency and percentages of passing all UOS in

each year of enrolment. By Year 4, all FT-NRSL students passed all UOS. With limited variability and low frequencies, no further analyses were undertaken to predict performance in Year 4.

Part-time students (RSL and NRSL)

There were no part-time students in Education.

Engineering

Full-time Recent School Leavers

Frequencies were either low or values were constant for some variables in all years for undertaking reliable goodness-of-fit tests among FT-RSL (Table 9.3.1).

Year 1

Of the 141 students who were assessed in Year 1, 88.6% passed all UOS in Year 1 (Table D1.2).

Initial models using single predictor variables

A series of logistic regression analyses were run using school achievement, the younger age group, school English level and home language background as single variable predictors (Table 9.3.1). Model chi-squares indicated significant differences between each of these single predictors and the constant-only models within each analysis. Wald statistics also indicated significant contributions of each predictor to each model. However, the lower expected frequencies in the models using age and school English levels as single predictors suggested the possibility of less reliable models when using each of these single predictors. Although correlations suggested significant associations between successful performance and younger ages, the majority of the students were under 20 years (92.9%) and variance was limited. Similarly despite correlations suggesting significant associations between successful performance

and higher school English levels, with 80.8% taking the higher levels of school English, variance was reduced.

Results of the analysis using school achievement as a predictor, suggested the final model was significant as a predictor of Year 1 performance (Table 9.3.1). The odds ratio suggests the chances of passing Year 1 were approximately 32% greater for every unit increase in TER (OR=1.32). However, the model produced four outliers. This model correctly classified 87.2% of students. As the course was very selective based on school achievement, none of the students was in the lowest quartile of TER and thus the distribution of TER was reduced. Correlations suggested a significant association between performance and school achievement (Table D2.1.1.4). Results of the logistic regression single-factor models are presented in Table 9.3.1.

Year 2

Of the 123 FT-RSL students in their second year, 78.9% passed all UOS (Table D1.2). With only 13% women in Year 2 and only 7.3% of students over 20 years of age, variance for variables representing gender and age was limited. All 16 women in Year 2 passed all UOS. There were significant associations between performance and home language background (Table D2.1.2.4).

Initial models using single predictor variables

Results of logistic regression analyses using student characteristics as single variable predictors of performance in Year 2 are presented in Table 9.3.1. The goodness-of-fit for the logistic regression model using English home language as a single predictor was significant ($\chi^2 (1, N=119) = 4.77, p<.03$). Although 79% of the students were classified correctly, these did not include those who failed. The Wald statistic was significant. The odds ratio suggested that the chance of passing all UOS in Year 2 was approximately three times higher for

those in the English home language group than the non-English group (OR=2.75). For just over half of the students (51.3%) in their second year, English was the main language spoken at home.

Year 3

Of the 103 FT-RSL students, 70.9% passed all UOS in their third year of enrolment. Significant association between performance success and English home language background was reported in Table D2.1.3.4. As in the previous year, all women passed all UOS.

Initial models using single predictor variables

A series of logistic regressions were run using each of the characteristics, school achievement, home language background, school English levels and socio-economic background as single predictors of performance (Table 9.3.1). The difference between the constant-only model and the model with home language background as a single predictor was significant ($\chi^2(1, N=98) = 5.89, p < .02$). A total of 72.4% students were correctly classified although students who did not pass were not correctly classified. The contribution of the independent variable was significant as indicated by the Wald statistic. The chance of passing all UOS was three times greater for the English home language group than the community language home background group. English home language background, as in second year, was the best single predictor of success in the third year.

Year 4

Of the 83 students in their fourth year, 78.3% passed (Table D1.2). All women were again successful in passing all UOS. There were 88.6% of students in their preferred course. Of the eight students who were not in a course of their first preference, five of the eight students failed to pass all UOS. Table D2.1.4.4 reports significant correlations between performance and school achievement,

school English levels, home language and course preference.

Initial models using single predictor variables

Logistic regression analyses using single predictors of performance in Year 4 are presented in Table 9.3.1. Considering the reduced variance and small cell frequencies for the above mentioned variables, results of the models using home language background, school achievement and socio-economic background were considered. Goodness-of-fit measures indicated the difference between the constant-only models and models with the single predictors, home language and school achievement were significant.

English home language background was significantly correlated with course preference, gender and school English level (Table D2.1.4.4). However, school achievement was not significantly correlated with any of these variables.

Adjusted models with more than one predictor variable

Following an examination of correlations and single predictors of Year 4 performance, a sequential logistic regression to predict performance in Year 4 was undertaken using home language background and school achievement as predictors. The model chi-square for the goodness-of-fit between the constant-only model and the final two-factor model was significant ($\chi^2 (2, N=71) = 11.54, p < .001$). There were 80.3% of students correctly classified by the model. There were three outliers (studentised residuals > 2) to the model. Both variables contributed significantly to the final model as indicated by the Wald statistics in Table 9.3.4. The odds ratio for home language background as predictor indicated the chances of success in Year 4 was 3.84 times higher for students with English as the home language, assuming TER was held constant. The odds ratio for school achievement indicated a 24% increase for each unit increase in TER assuming the variable English home language was held constant.

Full-time Non-Recent School Leavers

Only one FT-NRSL student commenced Engineering.

Part-time students (RSL and NRSL)

There were no part-time students in Engineering.

Nursing

Full-time Recent School Leavers

Year 1

Of the 174 students with data on performance in Year 1, 66.1% passed all UOS (Table D1.2). A large proportion of the students (94.8%) were 20 years or younger. As reported in Table D2.1.1.5, significant correlations were found between performance outcome in Year 1 and school achievement, school English level and home language background. Almost two thirds of students came from an English-speaking home background and 89% had taken the higher levels of school English.

Initial models using single predictor variables

The results of logistic regression analyses using each of the background characteristics as single predictors of performance are reported in Table 9.3.1. Some variables in each year had frequencies either too low or values were constant for reliable analysis. Model chi-square tests indicated three final models were significantly different to constant-only models using school achievement (χ^2 (1, $N=150$) = 9.84, $p<.001$), home language (χ^2 (1, $N=172$) = 7.95, $p<.01$) and school English levels (χ^2 (1, $N=154$) = 8.04, $p<.01$) as single predictors. The Wald statistics indicated significant contributions of each of these single variables to their respective models.

Adjusted models with more than one predictor variable

Home language background was significantly correlated to both school

achievement and to school English level. However, school achievement was not significantly associated with school English level (Table D2.1.1.5). As correlations suggested there was no significant association between school achievement and school English levels, and, both characteristics were significant single predictors of performance, an adjusted sequential logistic regression to predict performance was run using both variables as predictors. Results are presented in Table 9.3.4. The model chi-square test for the difference between the final two-factor model and the constant-only model was significant (χ^2 (2, $N=150$) = 14.50, $p<.001$). The Hosmer and Lemeshow test for the difference between the observed and expected frequencies for the model was non-significant. There were 70.7% of the students correctly classified by the model, although two students were classified as outliers. Both predictors contributed significantly to the model as indicated in Table 9.3.4. The odds ratio for school English level indicated that the chances of passing all UOS was 3.31 times higher for those students with higher levels of school English than for the lower level, assuming TER was constant. The chances for successful performance increases by 9% for each unit increase in TER assuming school English levels were held constant. This model was significant for predicting performance in the first year of Nursing for FT-RSL students.

Year 2

Of the 148 FT-RSL students in Year 2, 62.2% passed all UOS (Table D1.2). Most of the students (93.9%) were aged 20 years or less. Correlations were significant between performance and school achievement and also between performance and the level of school English (Table D2.1.2.5). The correlation between school achievement and school English level was also significant.

Initial models using single predictor variables

Results of the series of logistic regressions using each of the characteristics as single factors in the prediction of Year 2 performance are reported in Table 9.3.1. Results suggest both school achievement and school English levels were significant single predictors of passing all UOS in Year 2. Both showed significant improvements in the respective models compared to the constant-only model (Model: school achievement $\chi^2 (1, N=130) = 7.93, p < .01$; Model: school English level $\chi^2 (1, N=134) = 4.96, p < .03$). Both models showed significant Wald statistics as shown in Table 9.3.1. The odds ratios suggested the chances of passing Year 2 were approximately 9% higher for every unit increase in TER (OR=1.09). There were 63.8% of students correctly classified by this model. One case was an outlier in the solution. The chance of passing all UOS was 3.6 times higher for the higher school English levels than the lower (OR=3.60).

Adjusted models with more than one predictor variable

Considering the possibility that better English skills could marginally add to the predictive value of school achievement, an adjusted sequential logistic regression was run whereby school English level was added to the model with school achievement as single predictor. However, the goodness-of-fit test at the second step was not significant indicating school English level did not contribute significantly to prediction of Year 2 performance above the predictive model with school achievement. In summary, the model with school achievement as the single predictor was a significant model for the prediction of performance in Year 2.

Year 3

Of the 137 students enrolled in their third year, 81.0% passed all UOS

(Table D1.2). Table D2.1.3.5 indicates significant correlations existed between performance and home language, performance and school English level, and performance and age.

Initial models using single predictor variables

The results of logistic regression analyses using each of the background characteristic variables as single predictors of performance are reported in Table 9.3.1. With low expected frequencies and possible unreliable goodness-of-fit tests, the model using school English level as a predictor was not considered. The models with school achievement and with home language background as single predictors were significant. Both single-factor models were significantly different from the respective constant-only models (Model: school achievement $\chi^2(1, N=121) = 5.55, p < .02$; Model: home language $\chi^2(1, N=136) = 8.20, p < .001$). Wald statistics were significant for both predictors. However, with ten cases as outliers, the model with home language as predictor was a poor fit to the data. There were three outliers using the model with school achievement as the single predictor. Using the model with school achievement as single predictor, 83.5% of students were correctly classified. This model appeared marginally better in the prediction of success in Year 3. The odds ratio suggested the chances of passing all UOS in Year 3 improved by about 10% for each unit increase in TER (OR=1.10).

Full-time Non-Recent School Leavers

Year 1-3

Of the 95 FT-NRSL students assessed in Year 1, 73.7% pass all UOS. Of the 84 FT-NRSL in Year 2, 61.9% students passed all UOS. Of the 77 students with information on performance in Year 3, 89.6% passed all UOS (Table D1.3). There were no significant correlations between performance and student characteristics in Year 1, Year 2 or Year 3 for FT-NRSL (Tables D2.2.1.4,

D2.2.2.4 and D2.2.3.4).

Initial models using single predictor variables

A series of binary logistic regressions were run with performance as outcome and each of the student characteristics as single predictor variables for each year of enrolment (Year 1-3). However, as Table 9.3.2 indicates, there were no significant models for the prediction of performance.

Part-time students (RSL and NRSL)

There were only five who commenced as part-time students in Nursing.

Pharmacy

Full-time Recent School Leavers

Frequencies were either too low or values were constant for some variables for the reliability of goodness-of-fit tests (Table 9.3.1).

Year 1

Of the 137 students with information on performance in Year 1, 89.05% passed all UOS (Table D1.2). There were no significant correlations between performance in Year 1 and any of the variables representing background characteristics (Table D2.1.1.6).

Initial models using single predictor variables

Logistic regression analyses using student characteristics as single variable predictors of performance in Year 1 indicated no significant predictors of performance in Year 1 (Table 9.3.1).

Year 2

Of the 130 students enrolled in their second year, 83.1% passed all UOS. Correlations indicated significant associations between passing all UOS and gender (women), having higher levels of school English, and, higher school achievement (Table D2.1.2.6). The range of school achievement in this course

was narrow but high and above the median for all other courses.

Initial models using single predictor variables

A preliminary series of logistic regression analyses was run using the background variables as single predictors of performance in Year 2 (Table 9.3.1). Results suggested for single predictor models, the characteristics of gender, higher school English levels and school achievement predicted performance in Year 2 (Table 9.3.1).

The model of performance using gender as the single independent predictor variable showed a significant fit to the data ($\chi^2(1, N=130) = 3.94, p < .05$). Of the 83.1% of students correctly classified by the model, there were no correct classifications for students who did not pass all UOS. Using this model, the odds ratios suggested the chance of passing Year 2 was 2.6 times higher for women than men (OR=2.56).

The model of performance using levels of school English as the single predictor variable also showed a significant fit to the data ($\chi^2(1, N=124) = 5.50, p < .02$). Of the 82.3% of students correctly classified by the model, there were no correct classifications for students who did not pass all UOS. The odds for successful performance in Year 2 was about 4 times greater for students who took higher school English levels rather than the lower level (OR=3.59).

The model of performance using school achievement as the single predictor variable showed a significant fit to the data ($\chi^2(1, N=124) = 4.88, p < .03$). Of the 82.3% of students correctly classified, no failures were correctly classified. The odds ratios suggested the chances of passing Year 2 were approximately 38% greater for every unit increase in TER (OR=1.38).

Inter-correlations between school achievement, school English levels and

gender for those students in their second year indicated a significant association between school achievement and school English levels. Gender did not indicate a significant association with school achievement or with school English levels (Table D2.1.2.6).

Adjusted models with more than one predictor variable

A sequential adjusted logistic regression was run initially with school English as predictor to which gender was added. The addition of gender did not show a significant difference from the constant-only model at this stage. However, the model itself was significant ($\chi^2 (2, N=124) = 8.67, p<.01$). Wald statistics shown in Table 9.3.4 also suggested that only school English level contributes significantly to the model. The model indicated five outlier cases (studentised residuals > 2). Although results suggested students who took the higher levels of school English had a higher chance of success than the lower level with gender remaining constant, this was not a strong model.

Year 3

Of the 127 FT-RSL students in their third year of Pharmacy, 92.9% passed all UOS (Table D1.2). Correlations indicated a significant association between performance and gender (Table D2.1.3.6). Low frequencies in a number of cells were expected, with only 7.1% of students not passing all UOS (Table D1.2).

Initial models using single predictor variables

With these results in mind, a series of logistic regressions was run with performance as the outcome and each of these variables as single predictors. Results indicated that gender was a significant predictor of performance in Year 3 (Table 9.3.1). The model chi-square indicated a significant difference between the constant-only model and the model using gender as the single predictor. There were 92.9% of students correctly classified by the model. The odds ratio

suggested that women had a 6.10 times greater chance of passing all UOS than men. Gender was a strong predictor of successful performance in Year 3.

Full-time Non-Recent School Leavers

With only nine FT-NRSL students who commenced the course, correlations and logistic regression analyses for associations with, and prediction of performance in each year were not reliable.

Part-time students (RSL and NRSL)

Only six part-time students commenced the course.

Veterinary Science

The number of students who did not pass all UOS each year in this course was low (Table D1.2). Most students were enrolled as FT-RSL. Given the small enrolment of students in this course, logistic regression analyses of performance were not undertaken. A brief description of the characteristics of students and their performance outcomes follows.

Full-time Recent School Leavers

Year 1

Amongst the 57 FT-RSL in Year 1, there were only three students who did not pass all UOS (Table D1.2). These students were 20 years of age or younger, from an English-speaking home background, in a course of their first preference and all students had taken higher levels of school English. Two students were women and one from a rural background.

Year 2

Amongst the 56 FT-RSL in Year 2, there were five students who did not pass all UOS (Table D1.2). Of these students, four were 20 years of age or younger and all five were from urban areas and enrolled in their preferred course. Three were women, three were from an English home language background and

three had taken higher levels of school English.

Year 3-4

Only one FT-RSL student failed to pass all UOS in Year 3 and only one did not pass in Year 4.

Year 5

All students enrolled in their fifth year passed all UOS.

Full-time Non-Recent School Leavers

All students who were FT-NRSL, with scores on performance outcomes for each year of enrolment, passed all UOS in all years (Table D1.3).

Part-time Students (RSL and NRSL)

All students who were part-time, with scores on performance outcomes for each year of enrolment, passed all UOS in all years (Table D1.4).

Pathways through university pass through a number of learning contexts defined by the course, the students within these courses and by the stage of enrolment within each course. Students chose a variety of pathways through these contexts. Results indicated that a number of characteristics and demographics of students at the time of course entry predicted later performance outcomes in various learning contexts, in particular for the group of FT-RSL students. A variety of background characteristics and demographics of students commencing undergraduate courses predicted academic performance in the subsequent years within these courses. This indicated an interaction between the personal characteristics of students and the courses over stages of enrolment. The following tables summarise the above results.

Table 9.3.1

Logistic Regression Models within Courses using Single Predictors: Logit Coefficients, SE and Significance Levels of the Model and Predictors for FT-RSL students

Course	Characteristic	Year 1				Year 2				Year 3				Year 4				
		B	SE	Sig	Model sig	B	SE	Sig	Model sig	B	SE	Sig	Model sig	B	SE	Sig	Model sig	
A	School achievement	0.11	0.02	**	**	0.07	0.02	**	**	0.03	0.02							
	School English	1.91	0.57	**	**	1.13	0.49	*	*	0.35	0.54							
	Home language	0.39	0.20			0.46	0.23	*	*	0.32	0.27							
	Gender	0.41	0.17	*	*	0.47	0.21	*	*	0.50	0.24	*	*					
	Course preference	0.21	0.22			0.23	0.27			0.51	0.30							
	Age group-young	0.39	0.39			0.89	0.42	*	*	0.54	0.51							
	Age group-middle	-0.36	0.42			-1.31	0.47	**	**	-0.20	0.59							
	Age group-older	-0.52	1.00		1					-2.00	1.23							1
	Rural/urban	-0.35	0.32			0.58	0.36			0.53	0.40							
Socio-economic Ind	0.00	0.00			0.00	0.00			0.00	0.00								
B	School achievement	0.14	0.05	**	**	0.30	0.06	**	**	0.15	0.05	**	**					
	School English	1.21	0.48	**	**	1.35	0.49	**	**	0.84	0.53							
	Home language	0.73	0.30	**	*	0.41	0.32			0.35	0.37							
	Gender	-0.25	0.30			0.55	0.31			0.35	0.36							
	Course preference	-0.49	0.40			-0.76	0.43			-0.16	0.53							
	Age group-young	0.70	0.65			1.88	0.80	*	**	1.57	0.67	*	*					
	Age group-middle	-0.53	0.66			-2.58	1.06	*	**	-1.86	0.73	**	**					
	Age group-older				1													1
	Rural/urban	-0.23	0.93			0.44	1.02			1.89	1.24							1
Socio-economic Ind	0.00	0.00			0.00	0.00	*	*	0.00	0.00								

Table 9.3.1 (continued)

Logistic Regression Models within Courses using Single Predictors: Logit Coefficients, SE and Significance Levels of the Model and Predictors for FT-RSL students

Course	Characteristic	Year 1				Year 2				Year 3				Year 4			
		B	SE	Sig	Model sig	B	SE	Sig	Model sig	B	SE	Sig	Model sig	B	SE	Sig	Model sig
C	School achievement	0.20	0.06	**	**	0.05	0.05			0.06	0.06			0.19	0.14		
	School English	1.58	1.25		1	-5.94	25.92		1	-5.41	25.92		1	-5.62	42.73		1
	Home language	1.04	0.53	*	*	0.66	0.64			-0.09	0.86			0.05	1.20		
	Gender	0.24	0.68			1.50	0.78	*		1.37	0.95			1.81	1.30		
	Course preference	1.08	0.76			1.57	0.89			2.26	0.94	**	*	1.75	1.33		
	Age group-young		cons		1		cons		1		cons		1		cons		1
	Age group-middle		cons		1		cons		1		cons		1		cons		1
	Age group-older		cons		1		cons		1		cons		1		cons		1
	Rural/urban	-0.17	0.87			0.66	0.92			1.27	1.28			2.23	1.36		
	Socio-economic Ind	0.00	0.00			0.00	0.00			0.01	0.01			0.00	0.01		
D	School achievement	0.27	0.08	**	**	0.10	0.06			0.11	0.06			0.23	0.08	**	**
	School English	1.44	0.57	**	*	0.11	0.57			1.05	0.55			1.32	0.61	*	*
	Home language	0.84	0.58			1.01	0.48	*	*	1.12	0.48	*	*	1.18	0.61	*	*
	Gender	0.79	1.07			8.07	24.91		**	8.54	25.73		**	8.10	30.04		*
	Course preference	0.24	0.82			-0.08	0.83			0.51	0.72			2.16	0.81	**	**
	Age group-young	1.89	0.71	**	**	1.21	0.71			1.28	0.80			0.65	0.91		
	Age group-middle	-2.08	0.74	**	**	-1.44	0.75	*		-1.70	0.90		*	-0.95	0.96		1
	Age group-older				1				1				1				1
	Rural/urban	-6.22	20.15		1	-5.99	18.33		1	0.99	1.03		1	-5.90	25.92		1
	Socio-economic Ind	0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00		
E	School achievement	0.09	0.03	**	**	0.08	0.03	**	**	0.10	0.05	*	*				
	School English	1.49	0.54	**	**	1.28	0.59	*	*	1.64	0.62	**	**				
	Home language	0.94	0.34	**	**	0.65	0.35			1.27	0.45	**	**				
	Gender	0.39	0.42			0.80	0.45			0.73	0.55						
	Course preference	0.08	0.55			-0.40	0.63			-0.22	0.82						
	Age group-young	0.94	0.69			1.27	0.73			0.24	0.75	**	**				
	Age group-middle	-0.40	0.78			-0.83	0.78			-1.88	0.80	*	*				
	Age group-older				1				*			**	**				1
	Rural/urban	-0.77	0.67			0.08	0.58			-0.88	1.07						
	Socio-economic Ind	0.00	0.00			0.00	0.00			0.00	0.00						

Table 9.3.1 (continued)

Logistic Regression Models within Courses using Single Predictors: Logit Coefficients, SE and Levels of the Model and Predictors for FT-RSL students

Course	Characteristic	Year 1				Year 2				Year 3				Year 4				
		B	SE	Sig	Model sig	B	SE	Sig	Model sig	B	SE	Sig	Model sig	B	SE	Sig	Model sig	
F	School achievement	0.24	0.17			0.32	0.15	*	*	0.17	0.21							
	School English	0.61	0.64			1.28	0.53	*	*	0.96	0.75							
	Home language	1.78	1.05		*	0.97	0.66			1.17	1.08							
	Gender	0.30	0.55			0.94	0.48	*	*	1.81	0.82	*	*					
	Course preference	0.05	0.64			-0.43	0.62			-0.10	0.85							
	Age group-young	-7.19	31.51			0.99	0.75			0.68	1.13							
	Age group-middle	6.16	24.67			-0.96	0.90			5.68	24.67							
	Age group-older				1	-0.93	1.25		1	-2.68	1.46							1
	Rural/urban	-6.19	20.15			-6.71	22.84			-6.77	37.66							
	Socio-economic Ind	0.00	0.00			0.00	0.00			0.01	0.00							
G	School achievement	-0.16	0.45			0.23	0.17			0.78	0.54		*	0.57	0.337			
	School English	-6.66	49.82		1	2.51	1.17	*	**	12.10	116.40		*	12.1	117.9		*	1
	Home language	-7.52	51.95		1	2.24	1.00	*	*	11.01	108.55		1	11.01	109.7			1
	Gender	-0.55	1.26		1	-0.29	0.96		1	8.98	81.53		1	-8.87	87.57			1
	Course preference	-7.14	67.06		1	-6.90	40.68		1	11.59	110.99		*	-6.47	67.07			1
	Age group-young	-5.35	42.74		1	2.53	1.51		1	-5.23	70.46		1	14.2	166.7		**	1
	Age group-middle	5.33	60.43		1	-9.75	36.66		*	4.21	60.44		1					1
	Age group-older				1				1				1					1
	Rural/urban	1.37	1.30		1	-7.03	40.68		1	-6.33	67.07		1	-6.35	67.07			1
	Socio-economic Ind	0.00	0.01			0.00	0.01			0.03	0.03			0.03	0.03			

Note. Courses: A=Arts, B=Commerce, C=Education, D=Engineering, E=Nursing, F=Pharmacy, G=Veterinary Science

Characteristics (variables): school achievement (TER), school English (schEng), home language (englang), gender (gender), course preference (crs_pref), age group-young (age_y), age group-middle (age_m), age group-older (age-o), rural/urban (Rural_U), socio-economic index (IEdOcc).

Model significance indicates significance of single-factor model compared to constant-only model.

¹ The number of cases is low or a variable is constant or the variance is narrow. Veterinary Science Year 5 is not included as the number of students was too low for analysis.

Significance level: * $p \leq .05$, ** $p \leq .01$

Table 9.3.2

Logistic Regression Models within Courses using Single Predictors of Performance: Logit Coefficients, SE and Significance Levels of the Model and Predictors for FT-NRSL students

Course	Characteristic	Year 1				Year 2				Year 3			
		B	SE	Sig	Model sig	B	SE	Sig	Model sig	B	SE	Sig	Model sig
A	Home language	0.07	0.55			-0.13	0.81			-0.78	1.09		
	Gender	0.25	0.35			0.81	0.46			0.16	0.52		
	Age group-young	-0.02	0.40			-0.35	0.51			0.07	0.62		
	Age group-middle	-0.85	0.35	*	*	-0.55	0.46			-0.64	0.52		
	Age group-older	0.93	0.39	*	**	0.89	0.51			0.60	0.54		
	Rural/urban	0.43	1.24		1	1.68	1.44		1	8.79	25.92		** 1
	Socio-economic Index	0.00	0.00			0.00	0.00			0.00	0.00		
B	Home language	1.15	0.71			0.90	0.80			-0.36	0.95		
	Gender	0.01	0.69			0.61	0.80			0.24	0.99		
	Age group-young	1.72	0.72	*	**	1.18	0.76			-0.24	0.99		1
	Age group-middle	-1.38	0.73		*	-1.25	0.76			-0.26	1.01		1
	Age group-older	-1.04	1.21		1	0.15	1.28		1				1
	Rural/urban	-7.94	42.73		1	-7.17	42.73		1	1.47	1.55		1
	Socio-economic Index	0.00	0.01			-0.01	0.01			0.00	0.01		
C	Home language	-8.19	70.45		1	-9.02	70.45		1				1
	Gender	-8.19	70.45		1	-7.87	60.43		1				1
	Age group-young	0.94	1.28		1	-0.11	1.17		1				1
	Age group-middle	-1.70	1.26		1	9.20	57.53		1				1
	Age group-older	0.63	1.29		1	-1.50	1.23		1				1
	Rural/urban	0.61	1.39		1	0.56	1.55		1				1
	Socio-economic Index	-0.01	0.01			0.01	0.01						1
E	Home language	0.44	0.61			0.19	0.64			0.96	0.91		
	Gender	0.15	0.55			0.61	0.56			0.36	0.87		
	Age group-young	0.42	0.69			0.25	0.60			-0.46	0.88		
	Age group-middle	0.07	0.47			-0.31	0.45			1.89	1.10		*
	Age group-older	-0.29	0.47			0.18	0.47			-1.14	0.77		
	Rural/urban	-5.18	22.24		1	-5.73	22.24		1	-5.06	36.66		1
	Socio-economic Index	0.00	0.00			0.00	0.00			0.00	0.01		

Note. Course: A=Arts, B=Commerce, C=Education, E=Nursing. Characteristics (variables): home language (englang), gender (gender), age group-young (age_y), age group-middle (age_m), age group-older (age_o), rural/urban (Rural_U), socio-economic background (IEdOcc). Model significance indicates significance of single-factor model compared to constant-only model. ¹The number of cases is low or a variable is constant or the variance is narrow. Education Year 4 is not included as the number of students was too low for analysis. Significance level: * p≤.05, ** p≤.01

Table 9.3.3

Logistic Regression Models using Single Predictors of Performance across Years: Logit Coefficients, SE and Significance Levels of the Model and Predictors for PT students in Arts

Course	Characteristic	Year 1				Year 2				Year 3			
		B	SE	Sig	Model sig	B	SE	Sig	Model sig	B	SE	Sig	Model sig
Arts	School achievement	0.19	0.12		1				1				1
	School English												
	Home language	0.17	0.69										
	Gender	1.28	0.44	**	**	1.66	0.65	**	**	1.00	0.66		
	Course preference				1				1				1
	Age group-young	-1.32	0.52	**	**	-1.83	0.75	**	*	-1.46	0.75	*	
	Age group-middle	-0.67	0.54			0.19	1.11			-2.43	0.93	**	**
	Age group-older	1.26	0.43	**	**	1.23	0.66			2.29	0.67	**	**
	Rural/urban				1				1				1
Socio-economic index	0.00	0.00			0.00	0.01			-0.01	0.00			

Note. Characteristics (variables): school achievement (TER), school English (schEng), home language (englang), gender (gender), course preference (crs_pref), age group-young (age_y), age group-middle (age_m), age group-older (age_o), rural/urban (Rural_U), socioeconomic background (IEdOcc).

Model significance indicates significance of single-factor model compared to constant-only model.

Numbers are limited for school-related characteristics: school achievement, school English level and course preference.

¹ The number of cases is low or a variable is constant or the variance is narrow

Significance level: * $p \leq .05$, ** $p \leq .01$

Table 9.3.5

Logistic Regression Models with Multiple Predictors of Performance: Logit Coefficients, SE and Significance Levels of the Model and Predictors for PT students within Arts by Year

Course	Year	Characteristic	B	SE	Sig	Model sig
Arts	1	Gender	1.17	0.46	**	**
		Age group-older	1.15	0.45	**	**
		<i>constant</i>	-0.16	0.45		
	2	Gender	1.48	0.67	*	*
		Age group-older	0.95	0.69		*
		<i>constant</i>	0.21	0.64		

Note. Model significance of first predictor indicates significance compared to constant-only model. Model significance of second predictor indicates significance compared to one-factor model. Characteristics (variables): gender (gender), age group-older (age_o).

Year 1: Model compared to constant-only model: ($\chi^2(2, N=148) = 14.55, p < .001$). Overall model prediction success rate=79.7%. Year 2: Model compared to constant-only model: ($\chi^2(2, N=93) = 7.96, p < .05$). Overall model prediction success rate=87.1%

Significance level: * $p \leq .05$, ** $p \leq .01$

CHAPTER 10

COURSE COMPLETION

This chapter reports the analyses and results of an investigation into the association between completion outcomes of students, their characteristics and demographics and their learning contexts of courses over time. The appropriateness of a single *general* model of the prediction of completion outcomes within the broader context of combined courses was examined first in a brief exploratory analysis. Alternative models specific to learning context of each course were then investigated.

Analysis

Student data on the time taken to reach completion was arranged in the form DATA B, as described in Appendix A6. This ensured ‘time to completion’ referred only to those years of *actual enrolment* rather than *calendar years* from the time of course commencement.

Information on the variables representing completion outcomes and student characteristics and demographics are presented in Appendix A5. Course completion was represented by a binary categorical variable denoting completion and non-completion. For students who completed their course, ‘time to completion’ was also represented by a binary categorical variable indicating completion in minimum time and completion in longer than the minimum number of years. Logistic regression analyses were used to model the prediction of completion outcomes.

Results

For each course, Table 10.1.1 indicates the frequency and percentage of students who completed in the minimum number of years, those who completed

in more than the minimum time, and those who did not complete.

Table 10.1.1

Frequencies and Percentages of Completion Outcomes by Course

Completion	(a)				(b)				
	min time	> min time	not complete	total	min time	> min time	not complete	min time	> min time
	N	N	N	N	%	%	%	%	%
Arts	387	184	503	1074	36.03	17.13	46.83	67.78	32.22
Commerce	158	66	76	300	52.67	22.00	25.33	70.54	29.46
Education	62	9	39	110	56.36	8.18	35.45	87.32	12.68
Engineering	68	19	61	148	45.95	12.84	41.22	78.16	21.84
Nursing	187	37	91	315	59.37	11.75	28.89	83.48	16.52
Pharmacy	121	28	19	168	72.02	16.67	11.31	81.21	18.79
Veterinary Science	56	8	8	72	77.78	11.11	11.11	87.50	12.50

Note. (a) based on all students (b) percentages based only on students who had completed

Overall, there were 63.6% of students who completed their course, 47.5% completed in the minimum time and 16.0% took longer than the minimum number of years to complete, while 36.4% did not complete within the time of this project. Tables E1.1.1-E1.1.3 (Appendix E) present the frequencies and percentages of completion outcomes for each of the three student groups (FT-RSL, FT-NRSL and PT) within each course. Tables E1.2.1.1-E1.2.1.7, Tables E1.2.2.1-E1.2.2.7 and Tables E1.2.3.1-E1.2.3.2 present for each course cross-tabulations of frequency of completion outcomes by each student characteristic and demographic. Tables E2.1.1-E2.1.7, Tables E2.2.1-E2.2.4 and Table E2.3.1 present the inter-correlations between completion outcomes and student characteristics within each of the three student groups (FT-RSL, FT-NRSL and

PT). School-related variables were not available for students who had not recently attended school.

The results of analyses investigating the prediction of completion outcomes from student characteristics and demographics are presented in two sections. The results of preliminary analyses investigating the appropriateness of a *general* model within a context of combined courses are followed by results of analyses investigating models within the context of *specific* courses.

Completion within a general context

Analysis

As part of the preliminary analyses to investigate the appropriateness of a general model of completion outcomes within the context of combined courses, logistic regression analyses were used to examine the prediction of completion outcomes from student characteristics and demographics.

Appendix E3 presents the results of logistic regression analyses investigating the prediction of completion outcomes from student characteristics within a *general* context of all combined courses. Characteristics of students used as predictors included school achievement, school English level, home language background, gender, course preference, age, rurality and socio-economic background. Each course was represented by a dummy variable.

For each course, the mean predicted probability of course completion was examined. If results indicate the mean predicted probabilities of completion were dissimilar across courses, a general model of outcomes is not considered appropriate and further alternative models specific to context would need to be investigated.

Results

In this broader context, the mean predicted probabilities of course

completion for students within each of the seven courses (Table E3.2 and Table E3.4) for both FT-RSL and FT-NRSL student groups, suggested each set of predictors was acting differently within courses. The outcome of analyses did not suggest that a general model of performance was appropriate across all courses. Results indicated a strong possibility that models relevant to specific course contexts would provide a better understanding of the characteristics and demographics predicting completion. The results of this preliminary investigation justified further investigations within the specific contexts of each course.

Completion within specific course contexts

Analysis

For each of the seven courses and each of the three student groups (FT-RSL, FT-NRSL and PT) within these courses, prediction of the following student outcomes from each of the selected student background characteristics and demographics at course entry was investigated:

- completion or non-completion
- completion in minimum number of years

The characteristics of students who complete their course in longer than the minimum years may be different to those characteristics of students who complete their course within the minimum completion time. Although some students who had not as yet completed their course may eventually do so, this research was not concerned with comparisons between students who are taking longer than minimum time and students who have not as yet completed their course. Comparison between models of completion specific to courses was not the focus of the research. Analyses were used to separately model within the specific contexts of each course, the prediction of completion outcomes.

A series of logistic regression analyses were run, using a range of student characteristics as predictors, firstly to predict course completion and secondly to predict course completion in minimum time. Initially a preliminary series of crude logistic regression models were fitted to the data using each student characteristic as a predictor of the completion outcome. In order to find the best combination of two or more predictors to maximise the likelihood of obtaining the observed outcome, a series of sequential logistic regressions followed where appropriate. Improvement in the model at each stage of an analysis was assessed by comparing the observed frequencies with the frequencies predicted by the model using a goodness-of-fit χ^2 process. The contribution of each predictor to the final model was assessed using the Wald statistic and the odds ratio.

Characteristics and demographics used as predictor variables were age, gender, school English level, home language background, school achievement, course preference, rurality and the socio-economic background. The variable 'age' was divided into three separate variables representing young, middle and older age groups to enable a more detailed interpretation of results.

Results

Results are reported within each course for each of the three student groups. A summary of results of initial analyses using single-factor models of prediction are presented in Tables 10.2.1-10.2.3 for each of the student groups. With fewer students who were FT-NRSL, logistic regression analyses were limited to single predictor variables for this group. The numbers of FT-NRSL students in Engineering, Pharmacy and Veterinary Science courses were too low for logistic regression analyses. The Education course contained only a small number of FT-NRSL students. Table 10.2.2 presents the results of the analyses for FT-NRSL in Arts, Commerce, Education and Nursing courses. Analyses for PT

(RSL and NRSL) students were limited to single predictor variables in the Arts course (Table 10.2.3). Each Table presents the logit coefficient (B) and SE for the predictor variables, the significance of the Wald statistic together with comments on the number of cases in the analyses. Wald statistics $((B/SE)^2)$ and odds ratios (e^B) can be derived from information presented within each Table. Results of the analysis of significant adjusted models with more than one predictor are presented in Table 10.2.4.

Comments on analyses reported in Tables 10.2.1-10.2.4 follow.

Arts

Full-time Recent School Leavers

Completion or non-completion

Initial models using single predictor variables

Using school achievement as a single predictor, the model chi-square was significantly different from the constant-only model ($\chi^2 (1, N=580) = 17.17, p<.001$). The odds ratio suggested the probability of completing the Arts course was 1.1 times higher for every unit increase in TER (OR=1.06). With only 57.4% of students correctly classified by the model and the log likelihood statistic significant, this was not a strong model of prediction. No other characteristics were significant as predictors of course completion among FT-RSL.

Time to completion (minimum time or longer than minimum time)

Initial models using single predictor variables

Similar to the prediction of course completion, school achievement was the best single predictor. Results indicate the final model was significantly different from the constant-only model ($\chi^2 (1, N=340) = 10.27, p<.001$). For each unit increase in TER, students are 6% more likely to complete the course in the minimum number of years. However, again the log likelihood statistic was significant ($p<.05$) and only 64.7% of students were correctly classified.

Full-time Non-Recent School Leavers

Among FT-NRSL in Arts, being in the older age group (25 years or more) was a significant predictor of taking longer than the minimum time to complete the course (Table 10.2.2). The odds ratio indicated a low probability of completion in minimum time for this group (OR=.39). Results indicated the final model was significantly different to the constant-only model ($\chi^2 (1, N=101) = 4.85, p<.03$).

Part-time students (RSL and NRSL)

Initial models using single predictor variables

Analyses using school achievement and socio-economic background as single predictors did not indicate either variable was a significant predictor of completion. The number of part-time students was too low for reliable analyses using the remaining characteristics as predictors of either completion or time to completion. Results are presented in Table 10.2.3.

Commerce

Full-time Recent School Leavers

Completion or non-completion

Initial models using single predictor variables

Results indicated socio-economic background made a significant contribution as a single predictor of completion and the single-factor model itself was significantly different from the constant-only model ($\chi^2 (1, N=160) = 3.88, p<.05$). However, with the log likelihood statistic significant ($p<.05$) and the odds ratio (OR=1.004) barely better than an even chance of completion, socio-economic background was not considered a strong predictor.

Logistic regression analysis using school achievement as a single predictor of completion produced stronger results. School achievement was a significant

predictor and the model itself was significantly different from the constant-only model ($\chi^2(1, N=160) = 7.04, p < .01$). There were 76.9% of students correctly classified by this model. The chances of completing the Commerce course were 13% greater for every unit increase in TER (OR=1.13).

Adjusted models with more than one predictor variable

Although school achievement and socio-economic background were significantly correlated, a sequential logistic regression analysis was performed using both school achievement and socio-economic background as predictors of course completion. There was no improvement in model over the single-factor model showing school achievement as predictor.

Time to completion (minimum time or longer than minimum time)

Initial models using single predictor variables

Results indicated school achievement was also the only significant predictor of time to completion. The chances of completing in minimum time were also 13% greater for every unit increase in TER (OR=1.13). The model was significantly different from the constant-only model ($\chi^2(1, N=125) = 5.62, p < .02$) and 63.2% of students were correctly classified by the model.

School achievement remains the best predictor of course completion and completion in minimum time in Commerce among FT-RSL students.

Full-time Non-Recent School Leavers

Among FT-NRSL students in Commerce, being in the younger age group was a significant predictor of course completion (Table 10.2.2). The chances of completing the course was 12.4 times higher for the younger group than for those over 20 years (OR=12.35). The final model was significantly different to the constant-only model ($\chi^2(1, N=37) = 7.47, p < .01$).

Education

Full-time Recent School Leavers

Completion or non-completion

Initial models using single predictor variables

The best single predictor of completion in Education was gender. Women were approximately 8% more likely to complete the course than men (OR=7.89). The goodness-of-fit for the model was significantly different to the constant-only model ($\chi^2 (1, N=90) = 9.31, p<.01$) and 74.4% were correctly classified by the model.

Time to completion (minimum time or longer than minimum time)

Initial models using single predictor variables

The number of students was too low for reliable analyses using a number of variables as predictors (Table 10.2.1). The remaining analyses did not indicate any significant predictors of time to completion.

Engineering

Full-time Recent School Leavers

Completion or non-completion

Initial models using single predictor variables

Using gender as a predictor of completion indicated women had a 16% higher chance of completion than men among FT-RSL in the course (OR=6.16). Although goodness-of-fit statistics indicated the model was significantly different than the constant-only model ($\chi^2 (1, N=144) = 7.96, p<..01$), with only 58.9% of students correctly classified, the model was not strong.

Adjusted models with more than one predictor variable

With school achievement close to significance as a single predictor ($p<.06$) and no significant correlation between school achievement and gender, a sequential logistic regression analysis was performed with gender and school

achievement as predictor variables. Although the model itself was significant ($\chi^2 (2, N=125) = 7.41, p<.03$), neither the addition of school achievement nor gender as predictor variables was significant.

Time to completion (minimum time or longer than minimum time)

Initial models using single predictor variables

Both gender and school achievement were significant single predictors of time to completion. With restricted variance for gender, the outcome cannot be considered reliable. However, all women who completed the course did so in the minimum time, while only 73.5% of men completed. A significant association between gender and completion in minimum time was indicated by chi-square analysis ($\chi^2 (1, N=83) = 5.07, p<.02$) and by correlation (Table E2.1.4).

With school achievement as a single predictor, the odds ratio indicated the probability of completing in minimum time was 1.18 times higher for every unit increase in school achievement, indicating a significant effect. There were 74.3% of the students correctly classified by the model.

Nursing

Full-time Recent School Leavers

Completion or non-completion

Initial models using single predictor variables

Using gender as a single predictor of completion, the model chi-square indicated a significant difference between the single-factor and the constant-only model ($\chi^2 (1, N=177) = 4.86, p<.03$). The Wald statistic was also significant with the odds ratio indicating the chance of completion was 2.5 times greater for women than for men (OR=2.52).

Time to completion (minimum time or longer than minimum time)

Initial models using single predictor variables

Analyses indicated a number of significant single-factor predictors of time to completion. These included home language background, school achievement and school English level and the younger age group. Correlations between these characteristics are reported in Appendix E2. There was no significant correlation between school achievement and school English level (Table E2.1.5). Model chi-square analyses indicated all the single-factor models were each significantly different to the constant-only model. The number of students was low in some cells for the model using the younger age group as a predictor. Having an English home language background increased the chances of completion (OR=3.8). Those students who had taken higher levels of school English also increased the chances of course completion (OR=7.41). The odds of completing the course increased by 12% for every unit increase in TER (OR=1.12). These results suggested school achievement and English language skills were each important factors in time to completion.

Adjusted models with more than one predictor variable

A sequential logistic regression with school English level and school achievement as predictors was analysed. Although the final two-factor model was significant, the significance of the Wald statistic indicated that adding school achievement as an individual predictor did not add significantly to the model over using school English level as predictor. The odds of completing in minimum time was about four times greater for those with higher levels of school English, assuming TER was held constant (OR=4.31). Five cases were outliers and did not fit the model.

Comparing log-likelihood statistics in the crude models using school

English level and school achievement as predictors with the two-factor adjusted model, suggested the best model was that with school English level as a single predictor.

Pharmacy

Full-time Recent School Leavers

Completion or non-completion

Initial models using single predictor variables

Both higher school English levels and being in the younger age group were significant single predictors of completion in Pharmacy. Students with higher school English levels had an increased chance of completion (OR=3.26). There were 87.9% of students correctly classified by this model. The model chi square statistics indicated each model was significantly different from the constant-only model in both analyses. However, there were only a relatively small number of students not within the younger age group.

Adjusted models with more than one predictor variable

Past research (Holder et al., 1999) suggested higher school English levels together with school achievement were significant in the prediction of completion of a Pharmacy course. An adjusted model with school English level and school achievement as predictors was analysed. Results indicated both school achievement and school English were significant predictors. There were 88.6% of students correctly classified by the model. Model chi-square statistics indicated that at each step, the model was a significant improvement over the previous model. The chance of completion was approximately five times higher for those with higher levels of school English (OR=4.6) assuming TER was held constant.

Time to completion (minimum time or longer than minimum time)

Initial models using single predictor variables

TER was the only significant single predictor of completion in minimum time. For every unit increase in TER, students were 33% more likely to complete in minimum time (OR=1.33). There were 79.3% of students correctly classified by the model. The goodness-of-fit statistic suggested the model was significantly different from the constant-only model ($\chi^2(1, N=116) = 4.04, p<.04$).

Veterinary Science

Full-time Recent School Leavers

Completion or non-completion

Initial models using single predictor variables

With lower numbers of students who were FT-RSL in Veterinary Science, results are not necessarily reliable. Results suggested that students from urban areas had a significantly higher chance of course completion than rural students. The model itself was significantly different to the constant-only model ($\chi^2(1, N=56) = 5.25, p<.02$). However, student numbers were small.

Time to completion (minimum time or longer than minimum time)

Initial models using single predictor variables

Home language background was a significant predictor suggesting a 6.67% higher chance of completing in minimum time for students from an English home language background. The goodness-of-fit statistics indicated the model was significant ($\chi^2(1, N=54) = 5.04, p<.03$). However, numbers of students within the course were small.

Students negotiate a variety of pathways from course entry to successful completion of their course, taking either the minimum number of years or longer

to achieve this goal. Results indicate characteristics and demographics of students at course entry predict these completion outcomes differentially across the range of courses. Results support an interaction between completion outcomes, personal characteristics and the specific course contexts in which students are enrolled. Tables 10.2.1-10.2.4 summarise the results.

Table 10.2.1

FT-RSL: Logistic Regression Models within Courses using Single Predictors of (a) Course Completion and (b) Completion in Minimum Time. Logit Coefficients, SE and Significance Levels of the Model and Predictors

Course	Characteristic	(a)				(b)			
		B	SE	Sig	Model Sig	B	SE	Sig	Model Sig
A	School achievement	0.06	0.01	**	**	0.06	0.02	**	**
	School English	-0.51	0.50			0.31	0.55		
	Home language	-0.28	0.21			0.01	0.26		
	Gender	0.19	0.17			0.16	0.23		
	Course preference	0.10	0.22			-0.17	0.30		
	Age-young	0.17	0.39			0.47	0.53		
	Age-middle	-0.15	0.42			-0.44	0.57		
	Age-older				1				1
	Rural/urban	0.26	0.30			0.39	0.42		
	Socio-economic Index	0.00	0.00			0.00	0.00		
B	School achievement	0.12	0.05	**	**	0.12	0.05	*	*
	School English	0.65	0.48			0.48	0.53		
	Home language	0.42	0.37			-0.09	0.34		
	Gender	0.22	0.35			0.30	0.34		
	Course preference	-0.55	0.50			-0.62	0.48		
	Age-young	0.74	0.65		1	0.83	0.78		1
	Age-middle	-0.90	0.67		1				1
	Age-older				1				1
	Rural/urban	0.96	0.94		1				1
	Socio-economic Index	0.00	0.00	*	*	0.00	0.00		
C	School achievement	-0.01	0.03			0.03	0.06		
	School English				1				1
	Home language	-0.16	0.55			1.36	0.78		
	Gender	2.06	0.73	**	**				1
	Course preference	1.07	0.72						1
	Age-young				1				1
	Age-middle				1				1
	Age-older				1				1
	Rural/urban	1.17	0.80		1				1
	Socio-economic Index	0.00	0.00			0.00	0.01		
D	School achievement	0.08	0.04		*	0.16	0.08	*	*
	School English	0.30	0.46			0.91	0.67		
	Home language	0.53	0.35			801.00	0.56		
	Gender	1.82	0.77	*	**	8.18	25.73	**	1
	Course preference	0.50	0.59			0.34	0.91		1
	Age-young	0.82	0.67		1				1
	Age-middle	-1.12	0.73		1				1
	Age-older				1				1
	Rural/urban				1				1
	Socio-economic Index	0.00	0.00			0.00	0.00		

Table 10.2.1 (continued)

FT-RSL: Logistic Regression Models within Courses using Single Predictors of (a) Course Completion and (b) Completion in Minimum Time. Logit Coefficients, SE and Significance Levels of the Model and Predictors

Course	Characteristic	(a)				(b)				
		B	SE	Sig	Model Sig	B	SE	Sig	Model Sig	
E	School achievement	0.03	0.03			0.12	0.05	*	*	
	School English	0.08	0.57			2.00	0.65	**	**	
	Home language	0.34	0.34			1.33	0.51	**	**	
	Gender	0.92	0.42	*	*	-1.91	1.07			
	Course preference	0.48	0.53			-1.03	1.09			
	Age-young	-0.45	0.82			2.12	0.81	**	**	1
	Age-middle	0.10	0.85							1
	Age-older									1
	Rural/urban	-0.22	0.61			-0.67	1.08			
	Socio-economic Index	0.00	0.00			0.00	0.00			
F	School achievement	-0.27	0.16			0.28	0.15	*	*	
	School English	1.18	0.58	*	*	0.80	0.56			
	Home language	0.55	0.67			0.51	0.55			
	Gender	0.62	0.52			0.63	0.46			
	Course preference	1.16	0.60			0.41	0.54			
	Age-young	1.62	0.69	*	*	0.53	0.87			1
	Age-middle					-0.76	0.90			1
	Age-older	-3.62	1.16	**	**					1
	Rural/urban	0.78	0.85			-6.91	22.84			1
	Socio-economic Index	0.00	0.00			0.00	0.00			
G	School achievement					0.32	0.17			1
	School English									1
	Home language	-7.52	51.95			1.90	0.83	*	*	1
	Gender	-0.55	1.26			0.17	0.77			1
	Course preference					0.39	1.20			1
	Age-young									1
	Age-middle									1
	Age-older									1
	Rural/urban	2.96	1.31	*	*					1
	Socio-economic Index	0.01	0.01			0.00	0.00			

Note. Course: A=Arts, B=Commerce, C=Education, D=Engineering, E=Nursing, F=Pharmacy, G=Veterinary Science. Model significance indicates significance of single-factor model compared to constant-only model. Characteristics (variables): school achievement (TER), school English level (schEng), home language background (englang), gender (gender), course preference (crs_pref), age group-young (age_y), age group-middle (age_m), age group-older (age_o), rural/urban (rural_u), socio-economic background (IEdOcc).

¹ The number of cases is low or a variable is constant or the variance is narrow
Significance level: * $p \leq .05$, ** $p \leq .01$

Table 10.2.2

FT-NRSL: Logistic Regression Models within Courses using Single Predictors of (a) Course Completion and (b) Completion in Minimum Time. Logit Coefficients, SE and Significance Levels of the Model and Predictors

Course	Characteristic	(a)				(b)			
		B	SE	Sig	Model sig	B	SE	Sig	Model sig
A	School achievement								
	School English								
	Home language	-0.61	0.52			-0.10	0.64		
	Gender	0.29	0.30			-0.54	0.45		
	Course preference								
	Age-young	-0.14	0.35			0.46	0.53		
	Age-middle	-0.21	0.31			0.72	0.48		
	Age-older	0.31	0.30			-0.94	0.43	*	*
	Rural/urban				1				1
	Socio-economic Index	0.00	0.00			0.01	0.00		
B	School achievement								
	School English								
	Home language	0.32	0.81			-0.12	0.89		1
	Gender	0.11	0.81			-0.41	0.89		
	Course preference								
	Age-young	2.51	1.13	*	**	-0.63	0.95		1
	Age-middle	-1.44	0.82			1.31	1.17		1
	Age-older								1
	Rural/urban				1				1
	Socio-economic Index	-0.01	0.01			0.00	0.01		
C	School achievement								1
	School English								1
	Home language				1				1
	Gender				1				1
	Course preference								1
	Age-young	0.00	0.95		1				1
	Age-middle				1				1
	Age-older				1				1
	Rural/urban				1				1
	Socio-economic Index				1				1

Table 10.2.2 (continued)

FT-NRSL: Logistic Regression Models within Courses using Single Predictors of (a) Course Completion and (b) Completion in Minimum Time. Logit Coefficients, SE and Significance Levels of the Model and Predictors

Course	Characteristic	(a)				(b)			
		B	SE	Sig	Model sig	B	SE	Sig	Model sig
E	School achievement								
	School English								
	Home language	0.21	0.64			0.39	0.87		
	Gender	0.90	0.53			-0.75	1.10		
	Course preference								
	Age-young	0.37	0.69			-0.17	0.86		
	Age-middle	0.07	0.48			0.75	0.74		
	Age-older	-0.27	0.49			-0.62	0.69		
	Rural/urban				1				1
	Socio-economic Index	-0.01	0.00			-0.01	0.01		

Note. Course: A=Arts, B=Commerce, C=Education, E=Nursing. Model significance indicates significance of single-factor model compared to constant-only model. Characteristics (variables): school achievement (TER), school English level (schEng), home language background (englang), gender (gender), course preference (crs_pref), age group-young (age_y), age group-middle (age_m), age group-older (age_o), rural/urban (rural_u), socio-economic background (IEdOcc). Numbers are limited for school-related characteristics: school achievement, school English level and course preference.

¹The number of cases is low or a variable is constant or the variance is narrow
Significance level: * p≤.05, ** p≤.01

Table 10.2.3

PT (RSL and NRSL): Logistic Regression Models within Courses using Single Predictors of (a) Course Completion and (b) Completion in Minimum Time. Logit Coefficients, SE and Significance Levels of the Model and Predictors

Course	Characteristic	(a)				(b)				
		B	SE	Sig	Model sig	B	SE	Sig	Model sig	
Arts	School achievement	0.05	0.09							1
	School English									1
	Home language	-0.53	0.55							1
	Gender	0.51	0.40			0.36	1.21			1
	Course preference									1
	Age-young	-0.42	0.51							1
	Age-middle	-0.70	0.54							1
	Age-older	0.65	0.40							1
	Rural/urban									1
	Socio-economic Index	0.00	0.00			0.00	0.01			1

Note. Model significance indicates significance of single-factor model compared to constant-only model. Characteristics (variables): school achievement (TER), school English level (schEng), home language background (englang), gender (gender), course preference (crs_pref), age group-young (age_y), age group-middle (age_m), age group-older (age_o), rural/urban (rural_u), socio-economic background (IEdOcc). Numbers are limited for school-related characteristics: school achievement, school English level and course preference.

¹The number of cases is low or a variable is constant or the variance is narrow
Significance level: * p≤.05, ** p≤.01

Table 10.2.4

FT-RSL: Logistic Regression Models with Multiple Predictors of (a) Course Completion and (b) Completion in Minimum Time. Logit Coefficients, SE and Significance Levels of the Model and Predictors

(a)

Course	Characteristic	B	SE	Sig	Model sig
Commerce	School achievement	0.19	0.08	*	**
	Socio-economic background	0.00	0.00		
	constant	-17.73	6.83	**	
Engineering	Gender	1.37	0.80		*
	School achievement	0.08	0.04		*
	constant	-6.82	4.09		
Pharmacy	School English level	1.52	0.62	**	*
	School achievement	-0.35	0.16	*	*
	constant	33.80	15.44	*	

(b)

Course	Characteristic	B	SE	Sig	Model sig
Nursing	School English level	1.46	0.70	*	**
	School achievement	0.10	0.05		*
	constant	-5.53	3.09		

Note. Model significance indicates significance of single-factor model compared to constant-only model. Characteristics (variables): school achievement (TER), school English level (schEng), gender (gender) and socio-economic background (IEdOcc).

Significance level: * $p \leq .05$, ** $p \leq .01$

CHAPTER 11

RETENTION AND ATTRITION

This chapter reports investigations of associations between student characteristics and demographics and patterns of retention and attrition in student progression within each of the courses over time. Pathway patterns revealed that 59.4% of all students completed their course with no withdrawal, stop-out or transfer from their studies at any stage (Table C2.1). However, approximately 40% of students withdrew, stopped out or transferred temporarily or permanently at some stage.

Retention and attrition of students in each year involved choices to:

- enrol in a course
- temporarily leave a course (stop-out)
- transfer and later return to continue a course (transfer)
- permanently leave a course either transferring or leaving (withdrawal)
- not enrol as the course has been completed

These choices present the range of student enrolment choices in each calendar year following course entry. Table C2.1 indicated that students who left their course before completion did so at various stages following course entry. Some students exited following their first year while others left for the first time in later years. Students left for varying lengths of time and for varying numbers of times. The longitudinal pathway pattern for each student indicated their annual enrolment status for each year following course entry.

Retention and attrition within a general context

Analysis

To investigate the possibility that a general model of retention and attrition

outcomes may be more appropriate than models specific to course contexts, preliminary analyses examined aggregate retention and attrition rates both for combined courses and for students as a group within each specific course. Two contrasting approaches were used. The retention rates for each calendar year were calculated relative to enrolment at course entry for each course. The attrition rates were presented relative to enrolment in each previous year.

Results

Appendix F1 presents a series of retention and attrition rates for the groups of students within each of the courses and for all courses combined. Differences were indicated between courses in the *aggregate* retention and attrition rates for a *single enrolment choice* (enrolled or not enrolled) at a *single point in time* (Figures F1.1-F1.2). These differences suggested a better understanding of outcomes would be gained through models of retention and attrition relevant to specific course contexts. These results justified further investigations of retention and attrition outcomes at the *individual level* be undertaken within the *specific* contexts of each course rather than within the more general context of combined courses.

Retention and attrition within specific course contexts

Analysis

Attrition outcomes along progression pathways refer in this project to the year of a student's *initial* course departure. Re-entry to and any subsequent exit from a course were considered in relation to the first year of non-enrolment. For example, pathway patterns indicating those students who did not re-enrol for the *first* time in the year following Year 1 were grouped, those who did not re-enrol for the *first* time in the year following Year 2 were grouped, and so on. Within

these groupings, pathway patterns were further grouped to indicate those students who returned to their course, those who did not return, those who transferred, those who left either temporarily or permanently, those who returned and completed their course and those who did not reach completion following their return to the course. These categories of retention and attrition are summarised in Table 11.1. These categories formed the basis for subsequent analyses.

Table 11.1

Categories and Coding of Retention and Attrition Status

Category description	Code
Enrolled	E*
Not enrolled	NE*
Non-enrolment with later return	R*
Non-enrolment (transfer) with later return	RT*
Non-enrolment (stop-out) with later return	RW*
Non-enrolment and no return	NR*
Non-enrolment (transfer) with no return	NRT*
Non-enrolment (withdraw) with no return	NRW*
Completion	C*
Completion following transfer and return	TRC*
Non-completion following transfer and return	TRNC*
Completion following stop-out and return	WRC*
Non-completion following stop-out and return	WRNC*

Note. * denotes the year following the year of course entry. For example, E1 indicates the initial non-enrolment follows Year 1, E2 indicates the initial non-enrolment follows Year 2, and so on.

Figure 11.1 further outlines the relationship between these broad categories of retention and attrition and student pathway choices. Table 11.2 presents the categories of retention and attrition for each progression pathway.

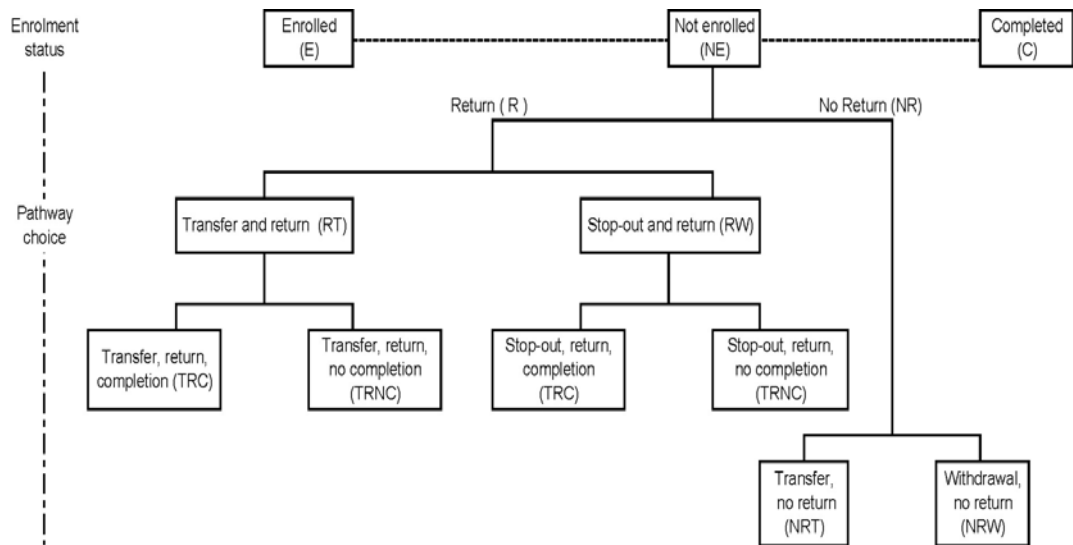


Figure 11.1. Enrolment status and retention and attrition categories of pathway choice

Table 11.2

Retention and Attrition Choices by Progression Path

Path	Retention/attrition code	Path	Retention/attrition code	Path	Retention/attrition code
00000000	E1 to E7	01006666	NE1, R1, RT1, T1, RTC1	000_1__	NE3, NR3, T3, NRT3
06666666	C1	01106666	NE1, R1, RT1, T1, RTC1	000_1111	NE3, NR3, T3, NRT3
00666666	C2	0110__	NE1, R1, RT1, T1, RTNC1	0001__	NE3, NR3, T3, NRT3
00066666	C3	0110011_	NE1, R1, RT1, T1, RTNC1	00011__	NE3, NR3, T3, NRT3
00006666	C4	00__	NE2, NR2, W2, NRW2	000111_1	NE3, NR3, T3, NRT3
00006666	C5	00_00_66	NE2, R2, RT2, T2, RTC2	0001111_1	NE3, NR3, T3, NRT3
00000066	C6	00_00006	NE2, R2, RT2, T2, RTC2	0001111_	NE3, NR3, T3, NRT3
00000006	C7	00_00066	NE2, R2, RT2, T2, RTC2	00010066	NE3, R3, RT3, T3, RTC3
0__	NE1, NR1, W1, NRW1	00_00666	NE2, R2, RT2, T2, RTC2	00010666	NE3, R3, RT3, T3, RTC3
0__0066	NE1, R1, RW1, W1, RWC1	00_06666	NE2, R2, RT2, T2, RTC2	0001_00_	NE3, R3, RT3, T3, RTNC3
0__00066	NE1, R1, RW1, W1, RWC1	00__000	NE2, R2, RW2, W2, RWNC2	00010_00_	NE3, R3, RT3, T3, RTNC3
0__06666	NE1, R1, RW1, W1, RWC1	00_0000	NE2, R2, RW2, W2, RWNC2	0000__	NE4, NR4, W4, NRW4
0__006666	NE1, R1, RW1, W1, RWC1	00_00_00	NE2, R2, RW2, W2, RWNC2	0000_06	NE4, R4, RT4, T4, RTC4
0__006666	NE1, R1, RW1, W1, RWC1	00__0_0_	NE2, R2, RW2, W2, RWNC2	0000_0_6	NE4, R4, RT4, T4, RTC4
0__0_0000	NE1, R1, RW1, W1, RWNC1	00__0_0_	NE2, R2, RW2, W2, RWNC2	0000_006	NE4, R4, RT4, T4, RTC4
0__000_00	NE1, R1, RW1, W1, RWNC1	00__000_	NE2, R2, RW2, W2, RWNC2	0000_0	NE4, R4, RW4, W4, RWNC4
0__0_0_	NE1, R1, RW1, W1, RWNC1	00__001_	NE2, R2, RT2, T2, RTNC2	0000_00	NE4, R4, RW4, W4, RWNC4
0__0_0_	NE1, R1, RW1, W1, RWNC1	00__0_1	NE2, NR2, T2, NRT2	0000_000	NE4, R4, RW4, W4, RWNC4
0__0_0_	NE1, R1, RW1, W1, RWNC1	00__0_11_	NE2, NR2, T2, NRT2	0000_0_	NE4, R4, RW4, W4, RWNC4
0__0000_	NE1, R1, RW1, W1, RWNC1	00__0111	NE2, NR2, T2, NRT2	0000_00_	NE4, R4, RW4, W4, RWNC4
0__0_0_	NE1, R1, RW1, W1, RWNC1	00__01_	NE2, NR2, T2, NRT2	0000_00_1	NE4, NR4, T4, NRT4
0__000_	NE1, R1, RW1, W1, RWNC1	00__01_	NE2, NR2, T2, NRT2	0000_1	NE4, NR4, T4, NRT4
0__0000_	NE1, R1, RW1, W1, RWNC1	00__011_	NE2, NR2, T2, NRT2	00001__	NE4, NR4, T4, NRT4
0__0_1_	NE1, R1, RT1, T1, RTNC1	00__0111_	NE2, NR2, T2, NRT2	0000011__	NE4, NR4, T4, NRT4
0__00_111	NE1, R1, RT1, T1, RTNC1	001__	NE2, NR2, T2, NRT2	000001111	NE4, NR4, T4, NRT4
0__01_	NE1, R1, RT1, T1, RTNC1	0011__	NE2, NR2, T2, NRT2	00001066	NE4, R4, RT4, T4, RTC4
0__1_	NE1, NR1, T1, NRT1	0011_1_	NE2, NR2, T2, NRT2	00001166	NE4, R4, RT4, T4, RTC4
0__1_	NE1, NR1, T1, NRT1	00111__	NE2, NR2, T2, NRT2	00001666	NE4, R4, RT4, T4, RTC4
0__111	NE1, NR1, T1, NRT1	001111__	NE2, NR2, T2, NRT2	00000_	NE5, NR5, W5, NRW5
0_1_	NE1, NR1, T1, NRT1	0011111_	NE2, NR2, T2, NRT2	000000_00	NE5, R5, RW5, W5, RWNC5
0_11_11_	NE1, NR1, T1, NRT1	00111111	NE2, NR2, T2, NRT2	000000_11	NE5, NR5, T5, NRT5
0_111_	NE1, NR1, T1, NRT1	00100006	NE2, R2, RT2, T2, RTC2	000001_	NE5, NR5, T5, NRT5
0_111111	NE1, NR1, T1, NRT1	00100066	NE2, R2, RT2, T2, RTC2	00000106	NE5, R5, RT5, T5, RTC5
01_	NE1, NR1, T1, NRT1	00100666	NE2, R2, RT2, T2, RTC2	000000_	NE6, NR6, W6, NRW6
01__111	NE1, NR1, T1, NRT1	0010_0_	NE2, R2, RT2, T2, RTNC2	000000_0	NE6, R6, RW6, W6, RWNC6
01__11_	NE1, NR1, T1, NRT1	000_	NE3, NR3, W3, NRW3	0000001_	NE6, NR6, T6, NRT6
011_	NE1, NR1, T1, NRT1	000_066	NE3, R3, RT3, T3, RTC3	00000010	NE6, R6, RT6, T6, RTNC6
011_1_	NE1, NR1, T1, NRT1	000_0066	NE3, R3, RT3, T3, RTC3	0000000_	NE7, NR7, W7, NRW7
011_11_	NE1, NR1, T1, NRT1	000_0106	NE3, R3, RT3, T3, RTC3		
0111_	NE1, NR1, T1, NRT1	000_0666	NE3, R3, RT3, T3, RTC3		
0111_1	NE1, NR1, T1, NRT1	000_000	NE3, R3, RW3, W3, RWNC3		
0111_111	NE1, NR1, T1, NRT1	000_0_0	NE3, R3, RW3, W3, RWNC3		
01111_	NE1, NR1, T1, NRT1	000_00_0	NE3, R3, RW3, W3, RWNC3		
01111_11	NE1, NR1, T1, NRT1	000_0_0_	NE3, R3, RW3, W3, RWNC3		
011111_	NE1, NR1, T1, NRT1	000_0_0_	NE3, R3, RW3, W3, RWNC3		
0111111_	NE1, NR1, T1, NRT1	000_00_0_	NE3, R3, RW3, W3, RWNC3		
01111111	NE1, NR1, T1, NRT1				

Note. Pathway: 0=enrolled, 1=transfer, _=not enrolled, 6=completed. Retention/attrition codes: NE=not enrolled, R=return, NR=no return, RW=stop-out and return, RT=transfer and return, NRW=withdraw/no return, NRT=transfer/no return, RTC=transfer, return and completion, RTNC=transfer, return, no completion, RWC=stop out, return and completion, RWNC=stop-out, return and no completion, T=transfer, W=withdrawal.
 Year: The last character in the retention/attrition code (NE1, T2, R1, etc) denotes the year following the year of course entry. NE1=non-enrolment in 1st year after the year of course entry, T2=transfer in 2nd year after the year of course entry, etc.

To investigate associations between the characteristics and demographics students bring to their course and the patterns of retention and attrition over time, a series of two-way cross-tabulations were analysed within each course. The student characteristics and demographics included: course preference, school achievement (TER: low $<Mdn$, high $\geq Mdn$), home language background, age group (≤ 20 years, >20 years), gender, school English level, urban or rural area of residence, socio-economic background (IEdOcc: low $<Mdn$, high $\geq Mdn$). Further information on the variables representing these characteristics is presented in Table A5.4. Within each course and within each calendar year following course entry, each student characteristic was tabulated against each enrolment choice.

Aside from those students who had already completed their course, the broad enrolment (E) and non-enrolment (NE) categories for each year were tabulated against each student background characteristic within each course. In response to Hypothesis 4.1, cross-tabulations were used to indicate the degree of association at each stage, between each student characteristic and the choice to remain enrolled (E) or to leave (NE). Enrolment and non-enrolment choices represented broad categories of retention and attrition which, although referring to the stage or year in which these choices were made, did not incorporate an overall longitudinal time dimension. Such choices indicated, at a specific stage only, decisions to leave the learning context or to remain. With this approach, attrition does not distinguish between students returning and students not ultimately returning to their original course.

In response to Hypothesis 4.2, the non-enrolment group was further divided into those students who subsequently *returned* (R) and those who did *not return* (NR) to their original course. Retention and attrition were considered over

time in terms of subsequent return and non-return among students who were not enrolled. From a longitudinal perspective, the *return* to a course following a period of non-enrolment was viewed in terms of course retention rather than in terms of course attrition (see Table A5.3). For each year following course entry, cross-tabulations investigated associations between each student characteristic and each of the enrolment choices (E or R, E or NR, R or NR) as illustrated in Figure 11.2.

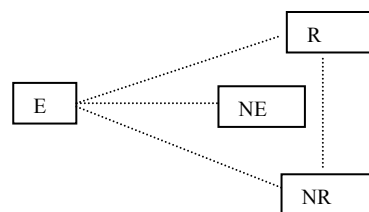


Figure 11.2. Broad categories of enrolment choice of retention and attrition

In response to Hypothesis 4.3, non-enrolment in the years following course entry was further classified into more specific forms of attrition and retention, forms characterised by withdrawal, temporary stop-out and course transfer. This expansion provided further information on retention and attrition choices along the progression pathway, as students left and returned to courses over time. For each calendar year, cross-tabulations between each of the student characteristics and demographics at course entry and each pair of possible enrolment choices indicated associations between characteristics and demographics and enrolment choice over time.

Each pair of enrolment choice categories representing retention and attrition presented in Figure 11.3 was tabulated against each student characteristic

or demographic. For example, the choice to remain enrolled in a year (E) or to transfer (T) to another course within the university was tabulated against each student characteristic. The choice between transfer with return (RT) to the course and transfer without return (NRT), the choice between enrolment (E) and transferring with later return (RT), the choice between enrolment (E) and transfer with no return (NRT) were similarly analysed. Paired comparisons between the students who choose to withdraw, with subsequent return or non-return, and those who remain enrolled were similarly analysed.

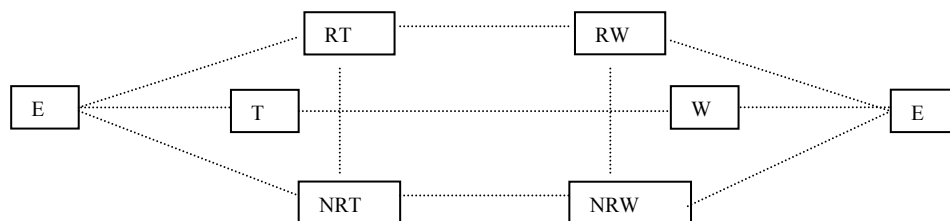


Figure 11.3. Expanded categories of enrolment choice of retention and attrition

With no assumption regarding the distribution of variables representing characteristics, the chi-square test of independence was used to examine associations between categories of enrolment choice and each of the background characteristics and demographics. As the present selection of students was a population study and not a random sample, emphasising trends and patterns rather than levels of significance, chi-square was used only as a guide to meaningful results ($p \leq .05$).

Analyses were undertaken within each course, within each year and within each of three groups of students (FT-RSL, FT-NRSL and PT). Data for analysis was arranged in the format DATA A as described in Appendix A6.

Results

Retention/attrition and progression

The frequency of students, in total and within each course, who left their course for the first time in a specific year, either temporarily or permanently (NE*) are summarised in Table 11.3. Similarly Table 11.4 indicates the frequency of non-enrolled students who did NOT return (NR*) to their course at a later date, Table 11.5 presents the frequency of those who returned (R*). Table 11.6 presents the frequency of those who transferred (T*). Table 11.7 presents the frequency of those who withdrew (W*). Each table also indicates the percentage first-time non-enrolment in each successive year as a percentage of the enrolment at course entry.

Table 11.3

Frequency and Percentage of First-time Non-Enrolment for Each Successive Year

Course		N at course entry	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
A	N	1074	301	119	70	20	13	11	1
	%		28.03	11.08	6.52	1.86	1.21	1.02	0.09
B	N	300	30	27	10	9	3	0	1
	%		10.00	9.00	3.33	3.00	1.00	0.00	0.33
C	N	110	22	13	6	1	0	0	0
	%		20.00	11.82	5.45	0.91	0.00	0.00	0.00
D	N	148	16	49	13	4	3	2	0
	%		10.81	33.11	8.78	2.70	2.03	1.35	0.00
E	N	315	54	21	7	9	0	2	2
	%		17.14	6.67	2.22	2.86	0.00	0.63	0.63
F	N	168	10	4	0	1	0	4	0
	%		5.95	2.38	0.00	0.60	0.00	2.38	0.00
G	N	72	3	3	14	3	0	0	0
	%		4.17	4.17	19.44	4.17	0.00	0.00	0.00
Total	N	2187	436	236	120	47	19	19	4
	%		19.94	10.79	5.49	2.15	0.87	0.87	0.18

Note. Year 1=1st year after course entry, Year 2=2nd year after course entry, etc. Course: A=Arts, B=Commerce, C=Education, D=Engineering, E=Nursing, F=Pharmacy, G=Veterinary Science. %=percentage of enrolment at course entry. Non-enrolment includes withdrawal, stop-out and transfer.

Table 11.4

Frequency and Percentage of First-Time Non-Enrolment in Each Successive Year who did NOT RETURN

Course		N at course entry	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
A	N	1074	273	103	54	12	11	9	0
	%		25.42	9.59	5.03	1.12	1.02	0.84	0.00
B	N	300	29	27	8	5	3	0	0
	%		9.67	9.00	2.67	1.67	1.00	0.00	0.00
C	N	110	19	11	5	1	0	0	0
	%		17.27	10.00	4.55	0.91	0.00	0.00	0.00
D	N	148	14	24	10	4	3	2	0
	%		9.46	16.22	6.76	2.70	2.03	1.35	0.00
E	N	315	48	18	6	6	0	2	0
	%		15.24	5.71	1.90	1.90	0.00	0.63	0.00
F	N	168	9	4	0	0	0	3	0
	%		5.36	2.38	0.00	0.00	0.00	1.79	0.00
G	N	72	3	2	1	0	0	0	0
	%		4.17	2.78	1.39	0.00	0.00	0.00	0.00
Total	N	2187	395	189	84	28	17	16	0
	%		18.06	8.64	3.84	1.28	0.78	0.73	0.00

Note. Year 1=1st year after course entry, Year 2=2nd year after course entry, etc. Course: A=Arts, B=Commerce, C=Education, D=Engineering, E=Nursing, F=Pharmacy, G=Veterinary Science. %=percentage of enrolment at course entry. Non-enrolment includes withdrawal, stop-out and transfer.

Table 11.5

Frequency and Percentage of First-Time Non-Enrolment in Each Successive Year who later RETURNED to Course

Course		N at course entry	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
A	N	1074	28	16	16	8	2	2	0
	%		2.61	1.49	1.49	0.74	0.19	0.19	0.00
B	N	300	1	0	2	4	0	0	0
	%		0.33	0.00	0.67	1.33	0.00	0.00	0.00
C	N	110	3	2	1	0	0	0	0
	%		2.73	1.82	0.91	0.00	0.00	0.00	0.00
D	N	148	2	25	3	0	0	0	0
	%		1.35	16.89	2.03	0.00	0.00	0.00	0.00
E	N	315	6	3	1	3	0	0	0
	%		1.90	0.95	0.32	0.95	0.00	0.00	0.00
F	N	168	1	0	0	1	0	1	0
	%		0.60	0.00	0.00	0.60	0.00	0.60	0.00
G	N	72	0	1	13	3	0	0	0
	%		0.00	1.39	18.06	4.17	0.00	0.00	0.00
Total	N	2187	41	47	36	19	2	3	0
	%		1.87	2.15	1.65	0.87	0.09	0.14	0.00

Note. Year 1=1st year after course entry, Year 2=2nd year after course entry, etc. Course: A=Arts, B=Commerce, C=Education, D=Engineering, E=Nursing, F=Pharmacy, G=Veterinary Science. %=percentage of enrolment at course entry. Non-enrolment includes withdrawal, stop-out and transfer.

Table 11.6

Frequency and Percentage of First-Time Transfer in each Successive Year

Course		N at course entry	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
A	N	1074	48	24	11	2	2	1	0
	%		4.47	2.23	1.02	0.19	0.19	0.09	0.00
B	N	300	14	10	4	3	1	0	0
	%		4.67	3.33	1.33	1.00	0.33	0.00	0.00
C	N	110	2	6	2	1	0	0	0
	%		1.82	5.45	1.82	0.91	0.00	0.00	0.00
D	N	148	8	41	9	4	0	1	0
	%		5.41	27.70	6.08	2.70	0.00	0.68	0.00
E	N	315	5	1	0	0	0	0	0
	%		1.59	0.32	0.00	0.00	0.00	0.00	0.00
F	N	168	2	0	0	0	0	1	0
	%		1.19	0.00	0.00	0.00	0.00	0.60	0.00
G	N	72	0	0	7	1	0	0	0
	%		0.00	0.00	9.72	1.39	0.00	0.00	0.00
Total	N	2187	79	82	33	11	3	3	0
	%		3.61	3.75	1.51	0.50	0.14	0.14	0.00

Note. Year 1=1st year after course entry, Year 2=2nd year after course entry, etc. Course: A=Arts, B=Commerce, C=Education, D=Engineering, E=Nursing, F=Pharmacy, G=Veterinary Science. %=percentage of enrolment at course entry.

Table 11.7

Frequency and Percentage of First-time Withdrawal in each Successive Year

Course		N at course entry	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
A	N	1074	253	95	59	18	11	10	1
	%		23.56	8.85	5.49	1.68	1.02	0.93	0.09
B	N	300	16	17	6	6	2	0	1
	%		5.33	5.67	2.00	2.00	0.67	0.00	0.33
C	N	110	20	7	4	0	0	0	0
	%		18.18	6.36	3.64	0.00	0.00	0.00	0.00
D	N	148	8	8	4	0	3	1	0
	%		5.41	5.41	2.70	0.00	2.03	0.68	0.00
E	N	315	49	20	7	9	0	2	2
	%		15.56	6.35	2.22	2.86	0.00	0.63	0.63
F	N	168	8	4	0	1	0	3	0
	%		4.76	2.38	0.00	0.60	0.00	1.79	0.00
G	N	72	3	3	7	2	0	0	0
	%		4.17	4.17	9.72	2.78	0.00	0.00	0.00
Total	N	2187	357	154	87	36	16	16	4
	%		16.32	7.04	3.98	1.65	0.73	0.73	0.18

Note. Year 1=1st year after course entry, Year 2=2nd year after course entry, etc. Course: A=Arts, B=Commerce, C=Education, D=Engineering, E=Nursing, F=Pharmacy, G=Veterinary Science. %=percentage of enrolment at course entry.

Within each calendar year following course entry, the frequency of students in all retention and attrition categories for each course, are presented in Figures F2.1-F2.3 (Appendix F). Differences are indicated between courses in the *number of students* leaving, differences in the *timing* of ‘exit’, differences in *frequency of ‘re-entry’* and differences in *forms or types of retention and attrition*. Across all courses only a small number of the many students who did not re-enrol each year actually return in later years. Following their first year, most of the FT-RSL students who left and returned, had chosen a year or more out of studies rather than a transfer to another course before returning. Fewer students transferred and returned at this stage. Frequency of exit and return following the first year was also low for FT-NRSL. Most FT-NRSL who did not enrol at this

stage did not return later.

Retention/attrition and student characteristics

The results of cross-tabulations between the various retention and attrition choices and each student characteristic and demographic follow, for each course and for each calendar year subsequent to course entry. Associations between an enrolment choice and each characteristic or demographic which are considered meaningful, are notated in Table 11.8. The coding of enrolment choices are presented as pairs of the choice categories listed in Table 11.1. For example, the choice between transfer and withdrawal is indicated by T.W, the choice between enrolling and not enrolling but returning later is indicated by E.R, the choice between transfer with no return and withdrawal with no return is indicated by NRT.NRW. In Table 11.8, the category which indicated a meaningful association with the characteristic is presented in bold underline font alongside the course and year to which the choice applies. For example, in the choice between transfer and withdrawal, an English speaking home background is associated with withdrawal in Arts following first year (**T.W**). A course preference other than first preference is associated with transfer rather than withdrawal in Arts following first year (**T.W**). Low school English levels are associated with leaving rather than transfer in Engineering following second year (T.**W**), and also, with leaving with no return rather than enrolling (E.**NRW**). Older FT-NRSL students choose to withdraw rather than enrol following second year in Commerce (E.**W**). In this case, all withdrawals failed to return (E.**W=NRW**). The following results refer to FT-RSL unless specifically mentioned otherwise.

Table 11.8

Retention and attrition choices by characteristic by course by year

Characteristic	Choice	Course	Year	Characteristic	Choice	Course	Year	
Home language				Age group				
English	E. <u>NE</u>, E. <u>NR</u>	Arts	1	≤20 years	E. <u>NE</u>, E. <u>NR</u>	Arts	1**	
	T. <u>W</u>	Arts	1		E. <u>W</u>, E. <u>NRW</u>	Arts	1**	
	RT. <u>RW</u>	Arts	1		E. <u>I</u>, <u>I.W</u>, <u>E</u>, <u>NRW</u>	Eng	2	
	NRT. <u>NRW</u>	Arts	1		E. <u>NR</u>=NE	Eng	4	
	E. <u>W</u>	Arts	1		E. <u>NR</u>=NE	Eng	5	
	E. <u>RW</u>	Arts	1		E. <u>W</u>=NRW	Eng	5	
	E. <u>NRW</u>	Arts	1		RW. <u>NRW</u>	Nurs	1	
	NRT. <u>NRW</u>	Arts	2		E. <u>RW</u>	Nurs	1	
	T. <u>W</u>	Arts	2		E. <u>R</u>, <u>R</u>, <u>NR</u>	Nurs	2	
	E. <u>R</u>	Arts	3		RW. <u>NRW</u>	Nurs	2	
	<u>T</u>=NRT, <u>W</u>	Com	1		<u>TRC</u>.<u>TRNC</u>	Vet	3	
	NRT=T, <u>NRW</u>	Com	1		>20 years	E. <u>NE</u>, <u>E</u>, <u>NR</u>	Arts	1**
	NRT=T, <u>NRW</u>=W	Com	3			E. <u>W</u>	Arts	1**
	E. <u>NRW</u>=W	Com	3			E. <u>NR</u>	Arts	3
	E. <u>NE</u>, E. <u>NR</u>	Educ	2	R. <u>NR</u>		Arts	3**	
	E. <u>NE</u>, E. <u>R</u>, <u>R</u>, <u>NR</u>	Eng	2	E. <u>NRW</u>		Arts	3	
	E. <u>RT</u>	Eng	2	RW. <u>NRW</u>		Arts	3**	
	E. <u>I</u>	Eng	2	E. <u>NE</u>		Com	2*	
	<u>RT</u>, <u>NRT</u>	Eng	2	E. <u>W</u>=NRW		Com	2*	
	<u>I</u>, <u>W</u>	Arts	1	E. <u>W</u>		Eng	2	
	<u>NRT</u>, <u>NRW</u>	Arts	1	E. <u>NRT</u>=T		Eng	4	
	<u>NRT</u>=T, <u>NRW</u>	Arts	2	E. <u>W</u>=NRW		Eng	5	
	E. <u>R</u>	Arts	3	E. <u>R</u>		Nurs	1	
	E. <u>RT</u>	Arts	3	<u>RW</u>, <u>NRW</u>		Nurs	1	
	T. <u>W</u>=NRW	Com	1	E. <u>R</u>, <u>R</u>, <u>NR</u>		Nurs	2	
	NRT. <u>NRW</u>=W	Com	1	<u>RW</u>, <u>NRW</u>	Nurs	2		
	<u>NRT</u>=T, <u>NRW</u>	Com	3	E. <u>W</u>=NRW	Phar	1		
E. <u>NE</u>; <u>R</u>, <u>NR</u>	Eng	2	School English					
E. <u>RT</u>	Eng	2	Higher	E. <u>NRW</u>	Com	2		
E. <u>T</u>	Eng	2		<u>I</u>, <u>W</u>, E. <u>I</u>, <u>NRT</u>, <u>NRW</u>	Eng	2		
Urban/Rural					<u>NRT</u>, <u>NRW</u>	Nurs	1	
Urban	E. <u>NRW</u>, <u>E</u>, <u>NRT</u>	Educ	2	Lower	E. <u>NE</u>	Phar	6	
	<u>TRC</u>.<u>TRNC</u>	Vet	3		E. <u>W</u>, E. <u>NRW</u>	Arts	3	
Rural	E. <u>NE</u>, E. <u>NR</u>	Educ	2		E. <u>NE</u>=NR	Com	2	
	E. <u>W</u>, E. <u>NRW</u>, E. <u>NRT</u>	Educ	2		T. <u>W</u>, E. <u>NRW</u>	Eng	2	
	E. <u>T</u>	Educ	2		E. <u>NRT</u>=T	Eng	4	
	E. <u>NE</u>, E. <u>NR</u>	Nurs	2		E. <u>NR</u>	Eng	4	
	E. <u>W</u>, E. <u>NRW</u>	Nurs	2		E. <u>R</u>, <u>R</u>=RW	Nurs	1	
	E. <u>W</u>=NRW	Phar	1		E. <u>RW</u>, <u>RW</u>, <u>NRW</u>	Nurs	1	
	E. <u>NE</u>=NR	Vet	1		E. <u>NE</u>	Phar	6	
	E. <u>W</u>=NRW	Vet	1		E. <u>W</u>=NRW	Phar	6	

Note. Choice: Bold underline font indicates choice associated with the characteristic. NRT=T indicates all transfers did not return (ie RT=0), NE=NR indicates all NE did not return (ie R=0) and so on.

Courses: Com=Commerce, Educ=Education, Eng=Engineering, Nurs=Nursing, Phar=Pharmacy, Vet=Veterinary Science

Year: Year indicates the year following year of course entry. For example, Year 1=year following the year of course entry, Year 2=second calendar year following the year of course entry.

All choices refer to FT-RSL students unless indicated otherwise as follows: * indicates FT-NRSL, ** indicates PT students.

Table 11.8 (continued)

Retention and attrition choices by characteristic by course by year

Characteristic	Choice	Course	Year	Characteristic	Choice	Course	Year	
Course Preference				Gender				
First	T, <u>W</u> , NRT, <u>NRW</u>	Arts	1	Women	R, <u>NR</u>	Arts	3*	
	RW, <u>NRW</u>	Arts	5		E, <u>R</u>	Arts	4*	
Other	E, <u>I</u> , E, <u>NRT</u>	Arts	1		<u>R</u> , NR; <u>RW</u> , NRW	Arts	4*	
	<u>I</u> , W	Arts	1		E, NE, E, R, E, NR	Com	4	
	E, <u>NE</u> , E, <u>NR</u>	Arts	2**	Men	E, NRW	Nurs	3*	
	E, <u>NRW</u>	Arts	2**			R, <u>NR</u>	Arts	1*
	<u>RW</u> , NRW	Arts	5			E, <u>I</u>	Arts	1*
	E, <u>NE</u> , E, <u>NR</u> , E, R, <u>R</u> , NR	Educ	1			<u>RW</u> , NRW	Arts	3*
	NRW, <u>RW</u>	Educ	1			<u>RW</u> , NRW, E, <u>RW</u>	Arts	3
	E, <u>W</u> , E, <u>NRW</u> , E, <u>RW</u>	Educ	1			R, <u>NR</u> , RW, <u>NRW</u>	Arts	4*
	E, <u>I</u>	Educ	3			E, R; R, NR	Arts	5
	E, <u>NE</u> , E, <u>NR</u> , E, R	Eng	1			E, <u>NE</u>	Com	1**
	E, <u>W</u> , E, <u>RW</u>	Eng	1			E, <u>NR</u>	Com	1**
	E, <u>T=NRT</u>	Eng	1			E, T=NRT	Com	1**
	E, <u>NE</u>	Nurs	1			E, <u>NE</u> , E, R, E, <u>NR</u>	Com	4
	E, <u>NE=NR</u>	Phar	1			E, <u>RT</u> , E, <u>I</u>	Com	4
	E, <u>T=NRT</u>	Phar	1			E, <u>W</u>	Com	4
						E, <u>NE</u> , E, R	Educ	1
					<u>RW</u> , NRW, E, <u>W</u> , E, <u>RW</u>	Educ	1	
					E, R	Nurs	1	
				<u>RW</u> , NRW, E, <u>RW</u>	Nurs	1		
				E, <u>NRW</u>	Nurs	3*		
TER				IEdOcc				
High (Q3-4)	E, NR	Arts	1	High (Q3-4)	E, W	Arts	2*	
	E, <u>NE</u> , E, <u>NR</u>	Arts	2**		E, <u>NE</u> , E, <u>NR</u>	Arts	6*	
	E, <u>W</u> , E, <u>NRW</u>	Arts	2**		E, <u>NRW</u> , E, <u>W</u>	Arts	6*	
	E, R, R, NR	Arts	6		E, <u>NE</u> , E, <u>NR</u> , E, <u>NRW</u>	Nurs	1	
	E, T	Arts	6		E, <u>NE</u> , E, <u>NR</u>	Nurs	2*	
	T, <u>W</u> , <u>RW</u> , NRW, E, <u>RW</u>	Arts	6		E, <u>NRW</u>	Nurs	2*	
	E, NE=NR	Com	2	Low (Q1-2)	E, NE	Arts	6*	
	E, NRW=W	Com	2			E, NRW, E, <u>W</u>	Arts	6*
	E, NRT=T	Com	2			E, W, E, NRW	Nurs	1
	E, NRW=W	Eng	3			NRT, <u>NRW</u> , RW, <u>NRW</u>	Nurs	2
E, <u>NR</u>	Arts	1			E, NE, E, NR	Nurs	2*	
E, <u>NRW</u>	Arts	1						
E, <u>NE</u> , E, <u>NR</u>	Arts	2						
E, <u>NRT=T</u> , E, <u>NRW</u> , E, <u>W</u>	Arts	2						
E, W, E, NRW	Arts	2**						
E, NE, E, NR	Arts	2**						
E, R	Arts	6						
E, <u>I</u> , I, W, E, <u>NRT</u>	Arts	6						
E, <u>NE=NR</u>	Com	2						
E, <u>NRW=W</u>	Eng	3						

Note. Choice: Bold underline font indicates choice associated with the characteristic. NRT=T indicates all transfers did not return (ie RT=0), NE=NR indicates all NE did not return (ie R=0) and so on.

Courses: Com=Commerce, Educ=Education, Eng=Engineering, Nurs=Nursing, Phar=Pharmacy, Vet=Veterinary Science

Year: Year indicates the year following year of course entry. For example, Year 1=year following the year of course entry, Year 2=second calendar year following the year of course entry.

All choices refer to FT-RSL students unless indicated otherwise as follows: * indicates FT-NRSL, ** indicates PT students.

Home language background

Home language background was associated with retention and attrition among FT-RSL students in Arts, Commerce and Engineering and to a lesser extent Education. For Arts students, cross-tabulations suggested an English home language background was associated with those who withdrew from their course following their first year, in particular those who did not re-enrol at a later date. There were a higher percentage of students from an English home language background among those who left than among those who remained enrolled. In particular, this pattern existed both for those students who stopped out and later returned to their course, as well as for those who failed to return following withdrawal. However, results indicated that following their first year, a higher percentage of students with a community language background were among those who left their course and transferred to another course when compared to those who withdrew without transfer. Those who withdrew tended to be from an English speaking home background. Amongst those who returned following a break in enrolment, a higher percentage of students from an English speaking home background were among those who returned following a stop-out compared to those who returned following a transfer. This pattern was repeated when the enrolment choice was between transfer and no return, and, withdrawal with no return. A higher percentage of students from an English speaking home background withdrew and failed to return, while a higher percentage of students with a community language background transferred without later returning. This suggest that following first year in Arts, an English speaking home background was associated with the choice to withdraw, whether returning or not, whereas a community language home background was associated with transfer without returning.

For those who withdrew for the first time following their second year in Arts, this association was maintained. Overall, following Year 2 in Arts, a higher percentage of those who transferred were from community language home background compared to the percentage of students from a community language home background among those who withdrew. The latter group tended to be from an English speaking home background.

To some degree the opposite outcome presented among Commerce students who left following their first year. A higher proportion of Commerce students from an English speaking home background chose to transfer to other courses compared with those who chose to withdraw. Among Commerce students who left their course following their first year, none returned later.

Among Engineering students who chose to leave their course following their second year, associations with home language background presented a different picture to Arts and Commerce. The association between the choice to enrol or not enrol and language background, indicated a higher percentage of students from an English speaking home background did not choose to re-enrol in Engineering following Year 2, compared to the percentage who chose to remain enrolled. The association between the choice to enrol and to leave but return later and language background indicated a higher proportion of English speaking background students chose to return compared to those who remained enrolled. Amongst those who left following Year 2, a higher percentage of English speaking background students returned later compared to those who did not. A higher percentage of students from community language home backgrounds were among this later group. In particular, a comparison of those who transferred and those who remain enrolled, indicated a higher percentage of those who transferred

were students with English speaking home background, whereas a higher percentage of students from community language background remained enrolled in their original course. This pattern was repeated when comparisons were made between those enrolled and those who transferred but later returned. Amongst those who transferred, a higher percentage of students from an English speaking home background returned, whereas among those who failed to return following Year 2 there was an even balance between students from English and community language home backgrounds.

In Education following Year 2, all who took a break from the course were students from an English speaking home background, whereas students from a community language home background remained enrolled. No students returned following non-enrolment after Year 2.

Following the minimum time for completion in Arts and Commerce, some associations were the reverse of earlier years. In Commerce following Year 1, among those who failed to re-enrol, those who chose to transfer and not return tended to be from an English speaking home background while those who withdrew were from a community language home background. In a similar comparison following Year 3, *withdrawal* with no return tended to be associated with an English speaking home background, while *transfer* and no return tended to be associated with a community language home background. In Arts following Year 3, a higher percentage of students from an English speaking home background remain enrolled compared to the percentage that chose to leave and later return.

School English level

The association between school English level and the enrolment choices of retention or attrition following the first year was not strong. Following first year,

Nursing was the only course which indicated an association with school English level. The two students who stopped out but returned later had taken the lower school English level. Whereas, amongst those who chose to remain enrolled following Year 1, 9.1% had taken the lower English level. Amongst all who withdrew following Year 1, the three students who returned all took the lower level of school English. Amongst those who did not return, only one student took the lower level of school English. Amongst this group of students who withdrew and failed to return, there was a greater percentage with higher school English levels compared to students who chose to transfer to other courses without return.

However, Engineering students who withdrew without returning following Year 2, tended to have lower school English level when compared to both those who chose to remain enrolled and those who chose to transfer without returning. Following Year 2 in Engineering, a higher percentage of students who had taken higher school English levels were amongst those who transferred when compared to those who withdrew. Amongst those who withdrew, there were a higher percentage of students who had taken the lower school English level. Comparing those who transferred with those who remained enrolled following their second year, 90.0% of those who transferred had taken the higher levels of school English compared to 76.9% among those who remain enrolled.

Students in Commerce who withdrew following Year 2, when compared to those who remain enrolled, 36.4% had taken the lower school English level compared to 13.8% who chose to remain enrolled. Amongst those remaining enrolled, 86.2% had taken the higher school English levels. Amongst those who withdrew, rather than transfer, and did not return, levels of school English were evenly distributed compared to the high percentage of students with higher school

English levels amongst those remaining enrolled.

In the years following the minimum time for course completion, a higher percentage of students who had taken the lower school English level were among various groups who chose not to enrol compared to those enrolled. Among students in Arts following Year 3, 14.8% of those who withdrew had taken the lower school English level compared to 3.6% who were enrolled, while 13.6% of those who withdrew without returning later had a lower school English level compared to 3.8% who remained enrolled. In Engineering following Year 4, both the students who did not re-enrol had taken the lower school English level compared to 20.5% amongst those remaining enrolled. In Pharmacy following Year 6, all three students not enrolled took the lower school English level whereas both of the enrolled students took the higher levels.

Course preference

Among FT-RSL in Arts following Year 1, cross-tabulations between course preference and the choice to enrol or to transfer, indicated that among the non-first preferences a higher percentage chose to transfer than chose to remain enrolled (22.0%). Of students who chose to remain enrolled, a higher proportion had placed the course as first preference. Whereas among students who transferred, the first and non-first preferences were more evenly distributed. The preferences of those students who transferred compared to those who withdrew were also distributed in a similar way with 51.9% of those students who transferred did not allocate a first preference to the course compared to 15.3% among those who withdrew without transfer. A higher proportion of students who withdrew in Arts following Year 1 had allocated first preference to their course compared to those students who transferred. Overall following Year 1 in Arts, those who chose not to transfer, that is, those who remained enrolled or who

withdrew, had a high percentage of first preferences and a lower percentage on non-first preferences compared to the percentage of those who transferred. Level of preference was roughly evenly distributed amongst those who transferred, whether or not they returned later.

Following Year 1 in Nursing, Education, Engineering and Pharmacy, there was a higher percentage of non-first preference amongst all who chose *not* to enrol compared to the percentage of non-first preference among those enrolled.

In Arts, Engineering, and Pharmacy in particular, a higher percentage of students among those who transferred without returning later, were in a course which was *not* their first preference compared to the proportion who chose to remain enrolled. It was similar in Engineering among those who withdrew compared to those who remained enrolled following Year 1. In Engineering there was only one student who returned following withdrawal after Year 1 and the Engineering course was not their preferred course.

In Education, the number of students who left their course over the years, whether stopping out, withdrawing or transferring, was low. However, those few students who took an alternative route compared to those who remained enrolled were *not* in their preferred course. For the single part-time Arts student who did not re-enrol following Year 2, Arts was not their preferred course. Whereas of the eight part-time students still enrolled, 87.5% were in their preferred course. Following Year 5, for the single FT-RSL student in Arts who returned following a stop-out, the course was not their first preference. Whereas for the six students who did not return, 83.3% were in a course of first preference.

Gender

Amongst FT-NRSL students in Arts following Year 1, all those who stopped out and returned later were women whereas amongst those who did not

return, 53.5% were men. Following Year 1, 83.5% of FT-NRSL students who transferred were men, while 39.7% of those who remained enrolled were men. For FT-RSL in Nursing following Year 1, two of the three students who left but returned later were men compared to a smaller proportion of men who remained enrolled. Amongst those who withdrew following Year 1, a higher proportion of those who returned were men compared to the proportion of those who did not return.

In Education following Year 1, 8.0% of those who remained enrolled were men whereas 33.3% of all those who did not re-enrol were men. The two students who returned were men. Of all those who withdrew, 35.7% were men compared to 8.0% amongst those who remained enrolled. The only students to return were men. Among those who did not return, 25.0% were men.

Of the part-time students in Commerce who did not re-enrol in the year following Year 1, all were men. None returned later to their course. Three of the four students transferred to another course.

Following the minimum time for completion for each course, associations between gender and categories of retention and attrition emerged over the years in Arts and Commerce. In these later years, frequencies were small in some of the attrition categories. FT-NRSL in Arts who left following Year 3, 75.0% of those who returned were men and 85.7% of those who did not return were women. Among FT-RSL following Year 3 in Arts, two thirds of those who left and returned were men while 70.9% of those who remained enrolled were women. Amongst FT-NRSL students who left following Year 3, a larger percentage of those who did not return were women (80.0%). However, among FT-NRSL in the Arts course following Year 4, the opposite occurred. All those who left and

returned later were women, and all who left and did not return were men. Both the FT-RSL students who left following Year 5 and later returned were men. Of those who did not return, 25.0% were men.

Similarly amongst FT-RSL in Commerce following Year 4, 83.3% of those who remained enrolled were women while 87.5% of those who left were men. Of those who chose not to return, a higher proportion were men (80.0%). Of those who did return, all were men and all returned following transfer to another course.

Age group

Among part-time students in Arts who left following Year 1, there was a higher proportion of younger students than among the students who remained enrolled. This was the case among all those who left their course, all those who did not return, and more specifically, amongst those who withdrew rather than transferred. A higher proportion of part-time students who remained enrolled were older. Similarly among FT-RSL students in Nursing who left following Year 1, all those who did not return were younger students, whereas the single older student was amongst those who returned following a stop-out. Among students who remained enrolled, a higher proportion were younger compared to those who stopped out and returned. Similarly following Year 2, the only student to stop-out (and return) was an older student, whereas all those who did not return were younger. Of those who remained enrolled, 5.8% were older students. However, in Pharmacy following Year 1, among those who remained enrolled, 93.1% were younger students, whereas among the few who withdrew, there were a higher proportion of older students.

Of those who left Engineering following Year 2, the year for transfer to a

second degree, all who transferred were from the younger age group, whereas 91.0% who remain enrolled were younger. Whereas two thirds of those who chose to withdraw were younger. However, there were a higher proportion of older students amongst those who withdrew without transfer, in particular who failed to return following Year 2, than among those who remained enrolled.

In Commerce, all FT-NRSL students who did not re-enrol following Year 2 were older students, none of whom returned to complete. Among those who remained enrolled, 37.5% were older students. For the students who transferred following Year 3 in Veterinary Science and returned later, those who completed were all from the younger age group. The only student not to complete following transfer and return was older.

Following minimum completion time (following Year 3), there were a higher proportion of older students in Arts who withdrew and did *not* return compared to the proportion among those who remained enrolled. Amongst the part-time students who left following Year 3, all those who did not return were older students while those who returned were split evenly between age groups. In Engineering following Year 4, one out of the three students who transferred and did not return was older, while 4.3% of the enrolled students were older. Following Year 5, all enrolled students were young while only one of the three students who withdrew was older.

School achievement

In Arts following Year 1, a greater percentage of students with higher school achievement were among those who chose to remain enrolled compared to those who left without returning. This pattern repeats in the year following Year 2 for FT-RSL students. Among those who left and did not return, following either a transfer or a withdrawal, there were a higher percentage of students with lower

school achievement in comparison to the school achievement level of students who remained enrolled. However, amongst part-time students in Arts following Year 2, the only student who left had a high level of school achievement, whereas the school achievement of all enrolled students was lower.

In Commerce following Year 2, there were a higher proportion of students with lower school achievement amongst students who withdrew without returning than among those who remained enrolled. In Engineering following Year 3, a high proportion of students with lower school achievement did not return compared to students who remained enrolled.

Following minimum completion time for all courses, enrolments in Arts were notable. Following Year 6 in Arts, the single student who withdrew and returned had a high level of school achievement whereas students who remained enrolled had a lower level of school achievement. For students who did not return, there was a mid range level of school achievement. Only one student (with lower level of school achievement) transferred at this stage, while those who remained enrolled had higher lower level of school achievement.

Urban or rural area of residence

Following Year 2 in Nursing, apart from students who transferred, those who withdrew and did not return were evenly split between rural and urban areas of residence. This was not the case amongst those who chose to remain where there were a higher percentage of urban students. Similarly in Education following Year 2, 44.4% of students who left without returning to their course were rural students, compared to 4.5% of those who remained enrolled. In both Education and Nursing, associations exist between the choice to enrol or not (whether in terms of transfer, transfer without return, withdrawal or withdrawal without return) and area of residence. Results indicated that for the students who

left, whether by transfer or withdrawal, the percentage of rural students was high compared to the percentage of rural students amongst those who remained enrolled. Amongst those who did not return, whether following transfer or withdrawal, there was an approximate even split between rural and urban place of residence, revealing a higher percentage of rural students than among those remaining enrolled.

In Pharmacy, among those who withdrew following Year 1 and did not return, 28.6% were from rural areas. Of those who remained enrolled, 5.8% were from rural areas. In Veterinary Science following Year 1, the only student to withdraw from the course was from a rural area. For students in Veterinary Science who transferred following Year 3 and returned later, those who completed their course all resided in urban areas at the time of course entry. The only student not to complete following transfer and return was from a rural background.

Socio-economic background

In the Nursing course following Year 1, 51.7% of students with high socio-economic indices were among those who did not enrol or return later, compared to 76.3% of students who remained enrolled who had lower socio-economic indices. Following Year 1 in Nursing, results suggest that a greater proportion of students who remained enrolled were from areas with lower socio-economic ranking compared to the residential areas of students who withdrew without returning. Amongst these students, the proportion of students with higher socio-economic ranking was greater. Amongst FT-NRSL, this association was also evident following Year 2. Among FT-RSL following Year 2, the only student who transferred (with no return) was from a higher socio-economic background, whereas students who withdrew (not returning) were from lower socio-economic background areas. Similarly the one student who returned following withdrawal

was from an area with a higher socio-economic ranking compared to the areas of residence of students who did not return. However, among FT-NRSL following Year 2 in Arts, results indicated an association between socio-economic background and the choice to enrol or withdraw. A higher percentage of students (64.4%) from areas with higher socio-economic ranking were amongst those who remained enrolled than among those who withdrew. Amongst those who withdrew, the area of residence of students was evenly distributed between high and low ranking. Following Year 6 among FT-NRSL in Arts, all students who remained enrolled were from areas of residence with lower socio-economic ranking. Whereas the students who did not re-enrol but withdrew without returning later, were both from areas of residence with higher socio-economic ranking.

Using a three-stage process within each course, results indicated associations between enrolment choices involving retention and attrition, and student background characteristics and demographics. Results indicated links between the characteristics and demographics students brought to their learning context and the pathway choices each student chose to take as they proceeded over the years.

Associations between student characteristics and demographics and their choice to remain enrolled or not were evident. Categorisation of retention and attrition into overall enrolment and non-enrolment for each year, does not incorporate a longitudinal perspective on student pathways over time and does not indicate the types of retention and attrition.

The expansion of these categories to indicate enrolment choices involving

return or non-return to a course introduced a time dimension. Patterns of association between the choice to return or not to return to the course, and student characteristics, varied across courses.

Further expansion of categories to include the types of withdrawal and transfer and completion provided more detailed information on student choice as each student moved in and out of course contexts over time. Enrolment choices such as these forming the underlying framework of longitudinal pathways over the years, were associated with a range of characteristics and demographics. Patterns of enrolment choice along the progression pathway varied across the learning contexts of courses.

Results indicated the background characteristics and demographics of students recorded at the time of course entry were associated with later retention and attrition outcomes differentially, both across courses and at different stages.

CHAPTER 12

OVERVIEW OF RESULTS

This overview highlights the interaction over time between the progression of students through university, the learning contexts of their undergraduate courses and the background characteristics and demographics of the students. Within a socio-ecological framework of changing contexts and choices over time, this interaction was evident in the application of the Pathway Model to student outcome indicators of academic performance, retention and attrition, and course completion within undergraduate courses at university.

Pathway choices and learning contexts

Pathways of progression

Diverse pathways of progression through university (H1.1)

There was support for Hypothesis 1.1 stating students choose diverse pathways through university. There was more than one common pathway of progression through university for undergraduate students. In particular, most students chose to take *direct* paths from entry to course completion (59.7%). In addition, other students withdrew permanently from their courses (27.2%), or temporarily stopped-out and later returned to their courses (4.7%). A few students transferred to other courses (8.4%), some returned to their original course (2.1%) although others did not (6.4%).

Diverse pathways through learning contexts (H1.2)

The results also supported Hypothesis 1.2. There was an interaction between the diverse pathways of progression students chose to take and the particular learning contexts of courses. Direct progression to completion was common yet this varied from 41.2% to 88.7% of students across courses. This diversity of pathways of progression through university was evident in a number

of ways. The proportion of students who withdrew from their courses varied across learning contexts from 8.3% to 37.2%. In addition, students who temporarily stopped out from their courses varied from 1.7% to 12.5% across learning contexts. Students who transferred to other courses ranged from 1.8% to 40.5% across learning contexts. Some students returned to their original course (varying from 0% to 18.2% across learning contexts) although others did not return (varying from 0% to 22.3% across learning contexts).

Learning context

Diverse characteristics and demographics within contexts over time (H1.3)

The results also supported Hypothesis 1.3. Student background characteristics and demographics varied differentially both across learning contexts and over stages. Among these diverse pathways of progression, ‘stage’ was considered both in terms of the year of a student’s actual enrolment and in terms of the calendar year following from their course entry. At *course entry*, the proportion of students under 20 years varied across courses from 64.1% to 90.5%, there was a wide variation in the proportion of women across courses from 12.2% to 87.3%, students in their preferred course varied across courses from 70.2% to 89.3%, and those students with high school English levels varied across courses from 80.8% to 96.5%. Students from English speaking home backgrounds varied across courses from 27.3% to 84.0%, and students from urban areas varied across courses 87.7% to 96.8%. The proportion of recent school leavers varied across courses from 63.5% to 99.3%. Levels of school achievement varied across courses (*Mdn* TER: 58.75 to 97.85), while socio-economic background also varied across courses (*Mdn* IEdOcc: 1004 to 1127).

Considering stage in terms of the *years of actual enrolment*, also illustrated a diversity of characteristics interacting with various courses over time.

For instance, at the *third* year of enrolment, students under 20 years varied across courses from 65.4% to 92.3%, the proportion of women varied across courses from 14.7% to 91.0%, students from an English speaking home background varied across courses from 27.5% to 81.5%, while students from urban areas varied across courses from 88.9% to 97.0%. However, in a *sixth* year of enrolment, the proportion of older students varied across courses from 0% to 100%, women varied across courses from 0% to 75%, students in their preferred course varied from 66.7% to 100%, students with higher school English levels varied from 0% to 90.9%, students from English speaking home backgrounds varied from 0% to 79.6%, while students from urban areas varied from 97.7% to 100%. At this stage, there was a wide range of school achievement across courses (43% to 100% of students with $TER > Mdn$) and a wide range of socio-economic background across courses (0% to 67.4% of students with $IEdOcc > Mdn$).

In terms of years of sequential *calendar years* from the time of course entry, the following provides examples of different characteristics interacting with different courses over time. In the *third calendar* year following their entry to the course, the proportion of students under 20 years varied across courses from 66.2% to 94.3%. There was a wide variation in the proportion of women across courses from 14.3% to 90.8%, those in their preferred course varied from 70.2% to 90.3%, while those with high levels of school English varied from 76.9% to 96.9%. Across courses, there was a wide range of school achievement at this stage (0 % to 100% of students with $TER > Mdn$) and a wide range of socio-economic background (26.3% to 59.6% of students with $IEdOcc > Mdn$). In the *sixth calendar* year following entry to the course, the proportion of older students varied across courses from 0% to 57.1%, women varied across courses from 0%

to 100%, those in their preferred course varied from 50% to 100%, students with high levels of school English varied from 25% to 100%, while students from an English speaking home background varied from 0% to 100%, and students from urban areas varied from 91.3% to 100%. Across courses, there was a wide range of school achievement (0 % to 100% of students with TER>Mdn) and a wide range of socio-economic background (0% to 70% of students with IEdOcc>Mdn).

Student behaviour outcomes

Performance

Background characteristics and demographics predict academic performance within learning contexts over time (H2.1)

There was support for Hypothesis 2.1 stating that background characteristics and demographics of students upon entry to a course predict academic performance in subsequent years. Using logistic regression, results showed student background characteristics and demographics predicted academic performance in the years following course entry. It is important to note that background characteristics and demographics made differential contributions to academic performance both across the years following course entry and across learning contexts.

As an example, successful performance among FT-RSL students in *first* year in the Arts course was predicted by school achievement, school English level and gender, while in the Education course, school achievement and home language background predicted success. In *second* year, school achievement and school English level predicted performance in Nursing, while age and socio-economic background predicted performance in the Commerce course. In *third* year, gender predicted performance in Arts while course preference predicted performance in Education. Course preference predicted successful performance in

fourth year in the Engineering course. Age predicted performance in different early years in Engineering but later in third year in the Nursing course. Home language background predicted performance in *first* year in Commerce, Education and Nursing, but in the *second* year in Arts, Engineering and Veterinary Science. Although school achievement predicted performance in most courses in *first* year, this characteristic also predicted performance in *second* year in Arts, Commerce, Nursing and Pharmacy, in *third* year in Commerce and Nursing and in *fourth* year in Engineering.

For FT-RSL, FT-NRSL and PT students, Table 12.1 summarises for each course over the years, the predictors of academic performance from student characteristics and demographics.

Completion

Background characteristics and demographics within learning contexts predict:

(a) course completion (H3.1)

(b) course completion in minimum time (H3.2)

There was support for Hypothesis 3.1 and Hypothesis 3.2 stating background characteristics and demographics of students upon entry to a course, predict course completion in the subsequent years and in particular, completion in minimum time. Overall results indicated 63.6% of students completed their course. However, patterns of progression indicated this result varied from 53.2% to 89.9% across learning contexts. Although overall, 47.5% of students completed their course in the minimum of time, a substantial percentage (16.1%) took longer than the statutory minimum number of years to complete. Of those students who completed, those taking longer than the minimum number of years varied across learning contexts from 12.5% to 32.2%. Results illustrated across learning contexts, the differential effects of student background characteristics and

demographics that contributed to later completion and in particular, to completion in the minimum time. The results from logistic regression analyses showed predictors of course completion varied across learning contexts and ranged across school achievement, school English level, gender, age, socio-economic background and area of residence.

Predictors of course completion in the minimum time included home language background (Nursing and Veterinary Science), school achievement (Arts, Commerce, Nursing and Pharmacy), age (Arts and Nursing) and school English level (Nursing). In particular, it is important to note that background characteristics and demographics make differential contributions both to course completion and to completion in minimum time across learning contexts. Predictors also differ for FT-RSL and for FT-NRSL.

Table 12.2 summarises for each course, for FT-RSL, FT-NRSL and PT students, those student characteristics and demographics predicting both course completion and completion in a minimum of time.

Retention and attrition

Background characteristics and demographics across learning contexts and across stages are associated with:

- (a) retention or attrition independent of later return or not to course (H4.1)
 - (b) retention or attrition characterised by later return or not to course (H4.2)
 - (c) retention or attrition characterised by stop-out, withdrawal or transfer (H4.3)
- (a) retention or attrition independent of later return or not (H4.1)

Broad categories of retention and attrition included a student's choice between remaining enrolled or not re-enrolling each year. The results supported Hypothesis 4.1 and indicated that a range of student background characteristics and demographics were associated with these broad categories of enrolment and

non-enrolment, both across learning contexts and across the years following course entry. These two broad categories of pathway choice, specific to each year following course entry, were categorised independent of later return or not, for those students who did not re-enrol in a specific year. A selection of results illustrates this interaction between the background characteristics and demographics of students, their course and the broad categories of retention and attrition over the years following course entry.

For each course within each year following course entry, cross-tabulations were used to indicate associations between this broad enrolment choice and each student characteristic and demographic. For example following *first year*, characteristics and demographics associated with this enrolment choice included course preference within the Arts course, gender within Education, home language background within Education, Engineering, Nursing and Pharmacy, area of residence in Veterinary Science. For part-time students, associations included age and gender in Arts and socio-economic background in Nursing. Following *second year*, characteristics and demographics associated with this choice among FT-RSL students, included school achievement in Arts and Commerce courses, rural or urban area of residence in Education and Nursing and school English level in Commerce. Among FT-NRSL students, associations following *second year* included age in the Commerce course and socio-economic background in Nursing. Whereas associated with this choice following the *sixth year*, was socio-economic background in Arts among FT-NRSL students, and school English level in Pharmacy among FT-RSL students.

Table 12.3 presents a summary of these associations between student characteristics and the choice to enrol or not enrol, for FT-RSL, FT-NRSL and PT

students, across courses and across the years following course entry.

(b) retention or attrition characterised by later return or not to course (H4.2)

Results indicated that among those students who had left their course at various stages following course entry, some had returned to their course in a subsequent year while others did not return at any later stage. The results supported Hypothesis 4.2 and indicated that across the years following course entry, student background characteristics and demographics were associated differentially across learning contexts with these broad choices of enrolment and, non-enrolment followed by return or no return.

As examples of these associations, school achievement was associated with the choice between enrolment and non-enrolment *with no return*, in the early years in the Arts and Commerce courses and non-enrolment *with return* in the later years in Arts. Age was associated with the choice between enrolment and non-enrolment *with no return* in the later years in Arts and Engineering, and, with enrolment *with return* in earlier years in Nursing. School English level was associated with enrolment and non-enrolment *with no return* in different years in the Commerce and Engineering courses, and, with enrolment *with return* in Nursing following first year. Gender was associated with the choice between enrolment and non-enrolment *with return* in the Arts, Education and Engineering courses across different years, and, with non-enrolment *with no return* in Commerce for part-time students following first year. Area of residence was associated with the choice involving *no return* in Education, Nursing and Veterinary Science in different years. Socio-economic background was associated with the choice involving *no return* in Nursing following second year and in Arts following sixth year.

For FT-RSL, FT-NRSL and PT students, across courses and across the

years subsequent to course entry, Table 12.4 presents a summary of these associations between student characteristics and the choice between enrolling and not enrolling with or without later return.

(c) retention or attrition characterised by stop-out, withdrawal or transfer (H4.3)

The results supported Hypothesis 4.3 and indicated student background characteristics and demographics were associated differentially, at different stages across learning contexts, with diverse forms of retention and attrition.

As examples of these associations, course preference was associated with *stop-out* following first year in Education and Engineering courses, and with *transfer* following first year in Arts, Engineering and Pharmacy courses. School achievement was associated with *withdrawal* across different stages in Arts, Commerce and Engineering courses. School English level was associated with *withdrawal* at different stages across different courses. Home language background was associated with *transfer with return* at different stages in Arts and Engineering. Gender was associated with *stop-out* and also with *transfer and return* across different stages and different courses. As a further example, age was associated with the choice to *withdraw* at different stages across different courses for FT-RSL, FT-NRSL and for PT students. Socio-economic background was associated with the choice to *withdraw* for part-time students, following second year in Nursing and following sixth year in Arts.

Table 12.5 illustrates the diversity of associations between student characteristics and demographics and enrolment choices that include different forms of retention and attrition, for FT-RSL, FT-NRSL and PT students, across courses and across years subsequent to course entry.

In summary, the results indicated that within the learning contexts of

undergraduate courses at university, there were diverse patterns of student progression. Students within these learning contexts also varied in their background characteristics and demographics. Results indicated that across a range of learning contexts, there were students with diverse characteristics and demographics who chose diverse pathways of progression through these learning contexts over the years following course entry. Results supported the proposal that choice in the progression pathway for students enrolled in undergraduate courses at university was a function of an interaction between the characteristics and demographics of students and their learning context over the time following course entry. The diverse choice of pathways across varied learning contexts associated with students with diverse characteristics and demographics supported the Pathway Model. In the application of this Pathway Model to student outcome indicators of performance, retention and attrition and completion, outcomes were successfully interpreted in terms of this interaction between background characteristics and demographics of students, their learning contexts and their enrolment choices over time.

Table 12.1

Predictors of Annual Performance from Student Characteristics and Demographics for FT-RSL, FT-NRSL and PT Students by Course

Characteristic	Course Year	Arts					Commerce					Education					Engineering					Nursing					Pharmacy					Veterinary Science				
		1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5					
Course preference																																				
School achievement																																				
School English level																																				
Home language																																				
Gender																																				
Age group-young																																				
Age group-middle																																				
Age group-older																																				
Urban/rural																																				
Socio-economic index																																				

Note. Year 1-5 represent the 1st to 5th year of course enrolment for each student.

Characteristics: The value of each characteristic associated with successful performance (passing all UOS) is as follows: course preference (first), school achievement (high TER), school English level (higher), home language (English), gender (women), urban/rural (urban), socio-economic index (high IEdOcc).

Student group: Table applies to FT-RSL students unless the following markers have been added: X=FT-NRSL, //=PT, *=(FT-RSL and PT) and ***(FT-NRSL and PT).

Table 12.2

Predictors of Course Completion and Course Completion in Minimum Time from Student Characteristics and Demographics for FT-RSL, FT-NRSL and PT Students by Course

Characteristic	Course Completion	Arts		Commerce		Education		Engineering		Nursing		Pharmacy		Veterinary Science	
		a	b	a	b	a	b	a	b	a	b	a	b		
Course preference															
School achievement		█	█	█	█			█	█	█	█	█	█		
School English level										█	█				
Home language										█	█				█
Gender						█		█		█					
Age group-young			X	X							█	█			
Age group-middle															
Age group-older															
Urban/rural														█	
Socio-economic index				█											

Note. Completion: a=course completion, b=course completion in minimum time.

Characteristics: The value of each characteristic associated with course completion is as follows: course preference (first), school achievement (high TER), school English level (higher), home language (English), gender (women), urban/rural (urban), socio-economic index (high IEdOcc).

Student group: Table applies to FT-RSL students unless the following markers have been added: X=FT-NRSL, /=PT.

Table 12.3

Associations between Student Characteristics and Demographics and the Choice to Enrol or Not Enrol for FT-RSL, FT-NRSL and PT Students by Course by Year

Characteristic	Course Choice	Arts						Commerce						Education						Engineering						Nursing						Pharmacy						Veterinary Science					
		1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
Course preference	E.NE		//																																								
School achievement	E.NE		*																																								
School English level	E.NE																																										
Home language	E.NE																																										
Gender	E.NE																																										
Age Group	E.NE		//																																								
Urban/rural	E.NE																																										
Socio-economic index	E.NE																																										

Note. Year 1-6=1st to 6th year after the year of course entry.

Enrolment choice: E.NE=choice between enrolment and non-enrolment. Non-enrolment refers to a student's first non-enrolment following course entry.

Student group: all associations indicated refer to FT-RSL unless the following markers have been added: X=FT-NRSL, /=PT, *(FT-RSL and PT).

Although meaningful associations are indicated, the direction of association between choice and characteristics has not been included.

CHAPTER 13

DISCUSSION

Pathways of progression

The results supported Hypotheses 1.1-1.3. The wide diversity in pathways of progression characterised by stop-out, transfer and withdrawal supported Hypothesis 1.1. The diversity of these pathways of progression within courses supported Hypothesis 1.2. The characteristics and demographics of students were diverse both across courses at commencement and over time within courses. Findings supported Hypothesis 1.3.

Pathways patterns showed that although there was a common pathway for many undergraduate students at university, other students made active decisions creating diverse patterns of progression over the years. Following course entry, the enrolment choices of students as they proceeded from one year to the next included the options of enrolment, temporary stop-out, withdrawal and course transfer. A majority of students proceeded straight through their course, remaining enrolled in consecutive years until the completion of their course. Yet other students took a break from their course. Some returned at a later time, others did not. Some completed their course while others did not. Gaps between years of study were not uncommon and change of enrolment status was a frequent occurrence. Time spent in other courses on campus before returning to the original course was also a frequent occurrence. Of those who did *not* return to their original course, a small proportion had transferred to another course within the university. It is plausible that others may have transferred to other universities. There remained a few students who were continuously enrolled for up to eight years after course entry without reaching completion.

Results showed that a substantial proportion of commencing students did not reach completion in the nominal time of a course. This result is supported by research within Australia and the UK (Martin et al., 2001; Urban et al., 1999) (McMillan, 2005; Yorke, 1998b). The PISC pathway method (Robinson, 2004) provided vital information on the pathways of progression of *all* students including those students who did *not* complete their course. Almost half the commencing students completed their course in minimum time. Although over one third of students did not complete their course, a proportion eventually completed but with interrupted progression. Yearly performance data revealed differences across courses in the proportion of students passing all UOS. The large body of research into 'transition' programs and first year on-campus experiences of students is a response to similar low retention rates among students (Australian Vice-Chancellors' Committee, 1992; Department of Education, Training and Youth Affairs, 1999d; Grayson, 2003; McInnis, James, & Hartley, 2000b; McInnis et al., 1995; Reynolds & Stanley, 1994; Rickinson, 1998; Yorke, 2000b).

The findings from this study make a unique contribution to the field. Pathway patterns of enrolment choices over time characterise the *diversity* of pathways leading to completion. In addition, pathway patterns illustrate the *frequency* as well as the *timing* of withdrawal at specific stages, of temporary stop-out and of return to course, as well as transfer to other courses within the university. The depth of detail at the student level for the cohorts of commencing students, over a substantial period of time, sets this aspect of the research apart from other studies, whether longitudinal or cross-sectional (Abbott-Chapman et al., 1992; Ballantyne, Bain, & Preston, 2002; Cobbin, Barlow, & Dennis, 1992; Department of Education and Science/Australian Vice-Chancellors' Committee,

1971; Dobson & Sharma, 1993; Dobson et al., 1997; Lewis, 1994; Martin et al., 2001; McClelland & Kruger, 1993; McMillan, 2005; Organisation for Economic Cooperation and Development, 1998; Price et al., 1992; Urban et al., 1999). With a large proportion of students leaving their course following their first year, valuable information relevant to progression and completion is lost by restricting research to the first and second years of a course, or solely to final completion outcomes. Findings here are supported by earlier research reporting that substantial proportions of students who leave their course, either return or would consider re-enrolling in the future (McMillan, 2005; Sharma & Burgess, 1994; West et al., 1986; Yorke, 1998b, 1999b).

The PISC method can also be used to organise institutional data for the analysis of student outcome indicators. Data for the analysis of retention was organised in sequential calendar years to provide information on students *not* enrolled, and then re-organised into sequential years of actual enrolment to apply the Pathway Model to indicators of performance and completion. A mismatch between the two approaches to recording stages in progression was evident in a significant percentage of students within each course, suggesting data concerning performance outcomes in other research could produce misleading results without the present sequencing of data.

The proportions of students who withdrew, stopped out, transferred or completed, varied widely across courses. There was also variability across courses in the stage at which students withdrew or stopped out. The proportion of students remaining enrolled past the nominal minimum time for a course also varied across courses. Choices in pathway direction varied within and across courses both in the progression pathways and in the distribution of students across these progression

patterns. Variation across courses was evident in the administration and structure of courses, variation in nominal course length, in work experience expectations and in associated double degrees or diploma courses. Courses varied in curriculum content and in student response to assessment, placing limitations and restrictions on future enrolment choice. However, the diversity of pathway patterns across courses could not be entirely explained by these differences. The learning contexts incorporated varied sub-cultures with types of courses encompassing the humanities, social sciences, the sciences and the health sciences. The various learning contexts of these courses provide diverse constraints both socially and academically in terms of obligations, requirements and opportunities and the profiles of students within. Student decisions are generally considered as personal responses to experiences within these contexts (Bornholt, 2001; Wigfield & Eccles, 2000). In principle, such personal decisions to remain within a course or to change direction, either within the university context or outside, are a response in part to the social culture of their learning context.

The PISC pathway method is a new approach, so there is no direct comparison with similar pathway patterns in other contexts. However, a small selection of studies indicate variations in attrition, completion and performance outcomes across courses, as well as in wider disciplines and fields of study (Dobson & Sharma, 1993; Dobson et al., 1996; Everett & Robins, 1991; Martin et al., 2001; Ozga & Sukhnandan, 1998; Power et al., 1987; Price et al., 1992; Shah & Burke, 1999; Urban et al., 1999; Yorke, 1998b). The variety of patterns of progression in this project indicated diversity in the sequences of student enrolment choices over time, not only within the university context in general but more specifically, within the context of each course. These diverse pathways

within different learning contexts reinforce the importance of acknowledging this diversity and the diversity of context within research paradigms involving student progression.

The findings indicated that characteristics and demographics of students were diverse both across courses at commencement and over time within courses. At each stage, whether by sequential calendar years following course commencement or course enrolment, there was great diversity within each learning context. At course entry, set against the predominance overall of young, urban, full-time students who had attended school in the previous year, there was great diversity across courses. Research within Australia supports this general profile of *commencing* students (Abbott-Chapman et al., 1992; Department of Education, Science and Training, 2001; Department of Employment, Education and Training, 1993, 1996; Gallagher & Conn, 1994; Martin et al., 2001; Urban et al., 1999). Yet the present findings provide new evidence of *changing* profiles over the sequential stages of a course.

With changing curriculum content and changing enrolment choices of students at each stage, the learning contexts incorporating these courses and students varied correspondingly. It seems that students interpreted their social context in making personal choices for each year. Apart from barriers to re-enrolment due to course failure, there were many progression pathways within these different learning contexts. The diversity of enrolment choices within contexts and at different stages within contexts, provided evidence of diverse responses to the same cultural messages for the varied groups of students enrolled within these courses.

The results clearly supported diversity in each component of the Pathway

Model. Diversity was evident in the successive enrolment *choices*, in patterns of choice across *courses*, and in the *characteristics and demographics* of students within these courses over *time*. Enrolment choices over time were shown to be diverse both within and across the stages of courses. Over time, such changes in the diversity of students within each course together with change to academic aspects of a course would contribute to changes in learning contexts over time.

Pathways, student characteristics and behaviour outcomes

In response to Hypotheses 2-4, the Pathway Model is examined in relation to student outcome indicators and presented below in terms of background characteristics and demographics of students recorded at course entry. Over time, personal response to surrounding learning contexts of courses is assumed to be evident through personal enrolment choices. These sequences of enrolment choices across the years map the process of progression. This research employed a unique and expanded definition of retention to include in addition, students who had left their course but subsequently returned at a later stage following stop-out. This approach was incorporated in the array of enrolment choices, and also in the investigation of course completion over an *extended* time. The student behaviour outcomes in relation to the Pathway Model, are best described in terms of three groups of student background characteristics and demographics - aspiration, ability and social factors.

Student pre-course aspirations

Course preference

A student's level of preference for undertaking a specific course, made prior to course entry, is an indication of student expectations, intentions and the value they place upon the course (Parker et al., 1993). Translation of this expectation to actual course entry is not solely a personal decision but also

dependent upon satisfying course admission criteria. Preference is a fluid notion encompassing changing course-related personal perceptions and values which may not necessarily be validated at subsequent course entry (Bornholt et al., 2004a). The perception and value of a preferred course and the interest and ability to successfully manage university study may or may not subsequently meet expectations. Among the enrolled students, some students were in courses that were lower down their preference ranking. They had been allocated to the course more on the basis of their past achievements than their preference. Although there are a complex range of factors which can play a role in course choice and enrolment preference, findings indicated subsequent behaviour outcomes of performance, retention and attrition, reflected to some extent these initial perceptions and expectations represented by their enrolment preference. The course and the stage in the course were crucial in this connection.

Student preferences for their course were associated with retention following the early years of some courses for FT-RSL and in later years for part-time students for other courses. Students who transferred out to other courses following first year in Arts, Engineering and Pharmacy without returning later, tended not to be in their first preference course. Evidence of course preference as an indicator of ongoing commitment to actual course completion was not supported. Although students in their preferred course in the later years of Education and Engineering generally performed well, there was only limited support for the association between preference and annual performance outcomes.

Students in their preferred course who have remained within their course may have felt a sense of belonging, of engagement with the course, of wanting to be there (Bornholt et al., 2004b). Those in less preferred courses may have

experienced a weaker sense of belonging, and have been more likely to leave either by withdrawing or transferring to another course. The association of course preference with retention in the early years in a number of courses provided support for this view.

Other students remained, despite a lower preference, perhaps coming to terms with their unmet expectations, or developing more positive views on the basis of their course experiences. In courses with a high ratio of first preference applications to quota places, there was less chance of changing to a more preferred course. Students chose to remain but may have felt a weaker sense of belonging within their learning context. With preference associated with retention following first year, the variability in course preference was progressively restricted over time, amongst students remaining enrolled in a course.

Inappropriate course choice or unmet course expectations were found to be related in general to early withdrawal and non-completion in a number of past studies (Department of Education, Training and Youth Affairs, 1999d; Dobson & Sharma, 1993; Evans & Farley, 1998; McGivney, 1996; McInnis, Hartley, Polesel, & Teese, 2000a; McInnis et al., 1995; Ozga & Sukhnandan, 1998; Peel et al., 2004; Power et al., 1987; Ramsay et al., 1996; Schedvin, 1985; Yorke, 1998a). However, these results were not presented longitudinally within courses at the student level.

Pre-course aspiration in the form of preference rank, was a characteristic associated in some courses with the choice to either remain enrolled or transfer out following first year. This characteristic was associated less with performance and completion outcomes. The association of preference with retention outcomes differed across learning contexts and to a limited extent across time suggesting

early preferences and aspirations were important in determining pathway direction in the early years.

Ability factors

School achievement

Results indicated school achievement was a strong predictor of performance in all courses, although at various stages across different courses. School achievement was associated with successful performance in at least one stage in each of these courses. In Veterinary Science, where all FT-RSL were high achievers at school, the range of school achievement was narrow and high. Within this narrow range, analyses would be unlikely to indicate school achievement as a significant predictor. Apart from Pharmacy and Veterinary Science, school achievement predicted performance in all courses in first year.

In combination with a higher school achievement, students with higher levels of school English had an increased probability of passing all UOS in the early years in Arts and Nursing. In addition to higher school achievement in some courses, there appeared to be added benefits for performance for those with an English speaking home background. In combination with strong school achievement in Education (first year) and Engineering (fourth year), students from an English speaking home background had a higher probability of success than students from a community language home background. Coming from an English speaking home background may to some extent be an indicator of oral English communication skills. Alternatively, these courses may have had a particular form of assessment relying more on communication skills than other forms of assessment. Although higher school achievement was associated with performance success in some contexts, the addition of an English speaking background increased this probability of success.

School achievement was also associated with reaching course completion in most courses and predicted the *time* taken to complete some courses. Although in some cases, a high proportion of students completed in minimum time reducing the variability, a higher school achievement level together with high levels of school English were good predictors of course completion within the minimum number of years. In another course context, a combination of higher levels in both school achievement and school English predicted completion. Past research supported this link (Holder et al., 1999; Jones et al., 2000).

The present findings make a unique and valuable contribution to research on performance and completion. Comparison of the present findings with past research is limited due to differences in context, types of analysis and available information. Much of past research relating to performance is limited to first year. Few studies have followed students to the completion of their original commencing course. With this in mind, past research has shown some support for an association between school performance and first year performance either within a wider learning context or in some specific courses (Abbott-Chapman et al., 1992; Burgum et al., 1993; Department of Education, Training and Youth Affairs, 1999d; Evans & Farley, 1998; Everett & Robins, 1991; Lewis, 1994; Power et al., 1987; West et al., 1986).

Although school achievement was a strong predictor of annual performance across many years in a number of courses and of completion in most courses, it was not as strongly associated with retention and attrition. There was a higher proportion of students with low levels of school achievement among those who withdrew or transferred in the early years in some contexts. This could have been partly related to academic failure.

School English level

The level of school English was also a single predictor of successful annual performance in most courses in the early years. The higher school English levels in combination with higher school achievement predicted completion in one context. In another context, school English levels predicted the time taken to reach completion with school English levels remaining important for performance in later years.

The level of school English was also associated with retention and attrition in various courses at different stages. For instance in later years in some contexts, students who remained within their course tended to have taken higher school English levels and had higher levels of school achievement while those who left without returning tended to have taken a lower school English level. Past research suggested these students may not have had the level of academic literacy skills to manage these university courses (Jones et al., 2000; Webb & Bonanno, 1995).

By contrast in another course, students who left early and returned later had taken a lower school English level, while those students with higher English levels tended to withdraw entirely. Although in another course, those who transferred temporarily tended to have taken higher levels of school English. Among students who chose *not* to return to this course, those with higher school English levels tended to transfer out to another course while those with the lower school English level withdrew.

Different school English levels were associated with different behaviour outcomes and enrolment choices at varying stages across different courses. The higher school English level was more consistently associated with successful performance and completion across courses and stages within courses, and to a lesser extent with retention and attrition.

Results suggested the academic-related characteristics of school English levels and school achievement level, at times in conjunction with an English speaking home background, were associated more with academic challenges reflected in performance and completion than with enrolment choices related to retention or attrition. These academic-related characteristics may act as part of a filtering process, selecting out through annual assessment processes, more successful high school achievers with better academic and better English language skills. With each successive year, this process may have progressively narrowed the variance in these factors resulting in less likelihood of finding these characteristics as significant predictors of later performance. The high percentage of lower school achievers in the years following the nominal times for course completion supported this association.

Social factors

Home language background

Students with English as the main home language had an advantage in academic performance in the early years in almost all the courses. Findings also indicated an English speaking background predicted course completion in the minimum number of years in some courses. This may explain the association with completion for younger students. There were no pre-requisites in English-related criteria for RSL in any of the courses. Poorer performance of FT-NRSL students from community language home backgrounds suggested there were positive effects of recent schooling for the younger students who had been within an English speaking environment. The findings support earlier reports (Lewis, 1994).

An English home language background was also associated with retention and attrition across various years in particular contexts. Although students from an English speaking home background had an advantage in annual performance in

some courses and in the time taken to course completion in others, this was balanced somewhat by the retention of students from a community home language background in some courses. Compared to students who remained enrolled, a high proportion of students from an English speaking home background were among those who left some courses. For instance, a higher proportion of students from an English language background left after the first year in Arts. In some contexts, a high proportion of students from a community language home background chose to remain enrolled rather than make other enrolment choices. Whereas a higher proportion of students from an English home language background were among those who withdrew, transferred temporarily or took a break from their course. In a particular context, students from an English speaking background may have entered via one of the tertiary preparation programs with the intention of transferring after first year, while in other contexts those students from an English language background who transferred out may be partly explained by the high proportion that placed their first course preference elsewhere. Students from an English speaking home background appeared more flexible in enrolment choices. An English speaking home background was associated with leaving temporarily or transferring temporarily to a second course. Students from a community language home background on the other hand, tended not to take time out or to transfer to additional courses. Although a lower level of English skills among those from a community language home background may have been a factor in performance and the time taken to completion, this did not explain why these students did not generally take stop-outs from their courses as did those from English speaking backgrounds. A non-English home language background does not refer to the length of time students have been resident in the country or to a

level of English skills. Further research is needed to examine the proportion of students who were recent immigrants who may have felt keen to gain educational qualifications and enter the workforce as soon as possible. Other studies support the lower attrition rates of students from non-English speaking backgrounds (Ramsay et al., 1998; Urban et al., 1999). However, home language was correlated in varying degrees with other characteristics, in particular gender. Interactions between gender, language background and outcomes may have contributed to differences in behaviour outcomes and academic choices across different courses.

Gender

In the women-dominated courses, a higher proportion of women than men completed, even though almost all the men enrolled were in their preferred course. In contrast, in courses in which men were in the majority, a higher proportion of the women than men also reached course completion. These women at course entry had also ranked the course as their first preference. The outcomes for gender minority courses were different for men and women. For instance, the minority group of women in Engineering remained within their course. In contrast, the minority group of men tended to leave Education and Nursing courses. If students identify and express their feelings of belonging and connection to the course in terms of the gender majority, self-stereotyping about natural talent and gendered comparisons with other students may have influenced choices to remain or leave the course (Bornholt, 2001). This process of identification, both personal and social, with those within a gendered context may have a different basis for men and for women. To feel a sense of belonging to the context, men may have felt more part of a male-dominated context. This would suggest men may feel out of place within women-dominated courses and possibly stop-out or leave the course before completion.

An alternative interpretation is that men and women may have identified with the gendered context in similar ways and made decisions in accordance with traditional social gender stereotyping. This would not have explained the success of women in Engineering. Research in The Netherlands suggested students in first year courses with a higher proportion of women, made more progress (Beekhoven et al., 2003). Beekhoven considered the possibility that women studied more effectively than men. The present findings indicated women in the Engineering course performed well. In this course, gender predicted course completion. The study of Lewis (1994) provided some support for these outcomes.

Findings suggested behaviour outcomes and enrolment choice were different for men and women, different across courses and the stages within courses. Gender predicted performance in different stages in particular contexts among FT-RSL. In gendered contexts, women tended to remain within their course and finally complete. In the present research, women do consistently well across all courses and all years. Varying across stages and courses, men have tendency to leave either temporarily or permanently. After first year in some courses, higher proportions of men were amongst those who left, temporarily in some contexts and permanently in others compared to the students who remained enrolled.

There were also gender differences among the student groups FT-RSL, FT-NRSL and PT. Among FT-NRSL students in some contexts and among PT students in others, higher proportions of men than women tended to withdraw following the minimum years to completion. Women enrolled part-time performed well at different stages in Arts but overall, in terms of course completion, there were no gender differences. This unexpected result between

gender and completion outcomes in this context may be explained by the different relationships between prior achievement, age and course completion in this context for men and women. Research has suggested that women are more successful in some courses (Beekhoven et al., 2003; Department of Education, Training and Youth Affairs, 1999d; Dobson & Sharma, 1993, 1995; Dobson et al., 1996; Dobson et al., 1997; Everett & Robins, 1991; Hoskins et al., 1997; McClelland & Kruger, 1993; McCrum, 1996; Shah & Burke, 1999; Urban et al., 1999).

Age

Although the majority of students were 20 years or younger at course entry, particular courses had higher proportions of older and FT-NRSL students. Older part-time students performed better in one course whereas younger students performed well across various stages in other contexts. The younger age group predicted completion in some contexts and completion in minimum time in other contexts, differentially for FT-NRSL and FT-RSL. Significant correlations between younger age groups and an English speaking home background amongst some courses, suggested literacy or communication skills may have been an intervening factor in such completion outcomes.

Older FT-RSL varied in different courses in the stage at which they chose to leave their course. Overall however, higher proportions of older students remained in most courses after the minimum time. However, in Engineering at the stage at which transfer to a second degree was common, the younger students tended to choose to transfer rather than to remain, whereas older students chose to withdraw rather than remain. Following the minimum completion time, amongst those students who transferred courses, a higher proportion of older students tended *not* to return compared to the proportion of younger students who remained

enrolled. Engineering students still enrolled in later years, were all young. Among the older students in Engineering and Pharmacy, there were higher proportions of men and students from community language home backgrounds. Communication skills may have been a contributing factor to attrition. An interaction between age and gender is a possible interpretation and one supported by Shah and Burke (1999) and Scott et al.(1996) in their work on completion outcomes. By contrast, in the women-dominated courses of Arts and Nursing, older students either remained or returned later to their course.

Generally speaking, older students are likely to have more commitments and responsibilities outside their course than younger school leavers. Although there are employment demands for younger students, this group is less likely to have added responsibilities of family and full-time work. In addition, older students may not have felt part of the predominantly younger group of students within their courses. However, older students are more likely to have thought carefully about course choice and the commitments of study and perhaps had a more focused approach to study than younger school leavers. Here the results of published research are conflicting. Although a number of studies find older students associated with withdrawal and non-completion (Ozga & Sukhmandan, 1997; Price et al., 1992; Scott et al., 1996; Shah & Burke, 1999; Yorke, 1999b), there are other studies which suggest older students perform better (Dobson & Sharma, 1993; Hong, 1984; Hoskins et al., 1997; Lewis, 1994; McClelland & Kruger, 1993; Urban et al., 1999). Differences in research approaches, in design and in context may have contributed to differences in research outcomes.

Considering age in conjunction with other characteristics, in particular gender and home language background, may provide the key to understanding the

complex outcomes both across courses and across stages within courses and the pathway choices students make.

Socio-economic background

Students in this project resided in areas above the national average in socio-economic indicators. This supported outcomes of past research indicating socio-economic background as a major contributing factor in student perspectives of value and attainability of and subsequent access to higher education (Department of Employment, Education and Training, 1990; James, 2002; Reay et al., 2001). Despite a widening of access to courses in recent years, the socio-economic inequalities in university participation were also indicated here. Although the overall range of socio-economic indices was high and relatively narrow, there was systematic variation in socio-economic background across course contexts, from a high median index in Arts to a moderate median index in the Education, Nursing and Pharmacy courses.

The Commerce course had an even balance of students from higher and lower socio-economic backgrounds. A higher socio-economic index was a single predictor of later performance and of course completion among FT-RSL students. Significant correlations between school achievement, socio-economic background and performance were maintained across the years. Strong correlations between an English speaking home background, higher socio-economic indices and higher school achievement, suggest ability factors may have been important contributing factors in annual performance and completion in this course. Yet there was no link between socio-economic indicators and annual performance or completion in other courses.

In contrast, socio-economic background was associated with retention and attrition in two contrasting women-dominated courses. Among the students who

withdrew in both courses, there were a higher proportion of students from *higher* socio-economic areas compared to those who chose to remain within their course. Students in the course with a relatively high socio-economic index were likely to be the older women. In the course with a relatively low socio-economic index, positive correlations between socio-economic background and school English levels suggest students with socio-economic advantage in this course may have had other options than study available.

Socio-economic background may have had different intervening effects on student choices and outcomes for different underlying reasons. Parental expectations, support, opportunities or financial factors may have had an effect on levels of annual performance and retention. Although much of past research has not been undertaken within the context of specific courses, there is general support for varying degrees of association, usually in first year, between higher socio-economic ranking and performance success (Abbott-Chapman et al., 1992; Allen, 1999; Dobson et al., 1997; West, 1985), socio-economic factors and completion (Urban et al., 1999, for NRSL) and socio-economic factors and discontinuation of studies (Abbott-Chapman et al., 1992; Allen, 1999; Scott et al., 1996, for women; Yorke, 1999b).

The present findings suggest socio-economic background is associated more with retention and attrition at various stages in some contexts and with annual performance level or completion in other contexts. Overall, findings suggest socio-economic factors together with some personal characteristics are associated with both the constraints and opportunities of choice of learning contexts.

Rural and urban area of residence

Educational resources and opportunities in Australian rural areas are

generally less comparable to those within most urban areas (James, 2002; James et al., 1999b; Long et al., 1995). Isolation and reduced educational support in rural areas are reported to contribute to educational disadvantage at all levels. Past research suggests a strong link between rurality and socio-economic indicators, with particular disadvantage for low socio-economic rural students who may see less relevance for higher education and have greater financial concerns (James, 2002; James et al., 1999b). In this project, participation of students from rural areas was low and provided support for this view.

In a number of courses, students from urban residential areas tended to remain within their course more than their rural counterparts who tended to withdraw or transfer out to other courses. In the course with a higher proportion of rural students at course entry, although a relatively small frequency, urban background was a predictor of course completion. Students who transferred from this course to another course but returned later to complete, were all young and from urban areas. Students from rural areas may have found re-location difficult or may not have had the same sense of belonging or connection with the urban student majority or the urban location. Unfamiliarity with university culture or less encouragement from parents and peers may marginalise those who do enrol. A social context unresponsive to their situation may be a factor in attrition.

Amongst urban students in the Education course, there was a significant association between women and course completion. This was not the case for rural students. Urban et al. (1999) point to an overall interaction between gender and rurality among NRSL, with women from rural areas more likely to complete their course than a similar urban NRSL group. With all rural Education students in the younger age group, there was no comparable group of students within this

specific course context. James found aspirations and expectations for higher education were strongly influenced by socio-economic factors, gender and geographic location (James, 2002).

Undoubtedly the relative effect of rurality and socio-economic factors in behavioural outcomes is complex. Disadvantage for rural students in progression and behaviour outcomes appeared to continue. Although the recommendations outlined in National Board of Employment, Education and Training Report (James et al., 1999b) for an integrated policy approach to improving participation of rural people is to be supported, the progression of students from rural areas already within the system needs to be monitored and supported.

Attendance type

With a significant increase in undergraduate part-time enrolments over the last decade (University of Sydney, 1994, 2002), universities need to be aware of the diversity among these students and the diversity of their pathways of progression. The additional pressures and responsibilities for part-time students in addition to their university studies mean that less time is spent on campus than for full-time students. Social factors within learning contexts may have less relevance to progression and associated behavioural outcomes than for their full-time counterparts. Present research suggests the social factors are of marginal importance to the university experience of part-time older students. For instance, younger part-time students in Arts and men in Commerce, withdrew from their courses following their first year. In Arts in the subsequent year, part-time students not in their preferred course and those with higher school achievement levels tended to leave and not return. With fewer part-time students among the courses, information on the behaviour outcomes of this group was limited.

A socio-ecological perspective

Pathways of progression

Over time, students followed a diverse and complex series of pathways through undergraduate courses. The personal characteristics and demographics of these students were also diverse viewed both across courses at course entry and at different stages within courses. The behaviour outcomes of annual performance, completion, retention and attrition of the present selection of students provided differential support for the Pathway Model. Interactions between the four basic components of the model (enrolment choices and the personal and the social contexts of students across time) supported a socio-ecological perspective on student progression.

Pathways and behaviour outcomes

The results illustrated that the behavioural outcomes of performance, completion, retention and attrition can to varying degrees, be interpreted in terms of interactions between the *enrolment choices* students make over *time* (pathways of progression), and the different *learning contexts* encompassing the different *courses* and the different *characteristics and demographics* of students.

Retention and attrition outcomes provided strong support for the model. Ability factors were linked more with performance and completion outcomes and less with retention and attrition outcomes. Student aspirations were linked with remaining or leaving following first year in some courses. Yet various social factors explained a range of choices related to retention and attrition, varying both across *courses* and the *stages* of a course. Results showed various forms of retention and attrition choices were associated differentially with student background characteristics, the learning contexts and the stages that students had reached within their course.

Achievement-related outcomes of performance, completion, completion in minimum time, along the progression pathways, suggested that ability characteristics were strong underlying factors in all courses and at most stages, particularly in first year. School achievement, school English level and to some extent home language background, explained performance outcomes, either explicitly as predictors or implicitly, given the restricted distribution of relevant variables, across all courses and in most years. To this extent, results indicated performance outcomes, viewed in terms of the Pathway Model, provided less support for an interaction between the characteristics related to student ability, the specific course contexts and the stage of a course. Performance outcomes of those students who chose to remain within their learning contexts were associated with past school achievement and English-related factors at each stage within most courses. School achievement and school English level appear to have had ongoing importance for later performance in most courses at most stages. Higher levels of school achievement were more likely to give a student the option of remaining within their course in ongoing stages. A wider choice of academic options was available for those who were successful academically. However, student pre-course aspirations showed less association with performance and completion. Social factors did however indicate fluctuating degrees of association over time. The social characteristics and demographics predicting annual performance included age, gender, socio-economic background, home language background and residential geographical area. These varied in importance across courses and over the years from course entry. At different stages within different courses, higher school achievement appeared to present a foundation upon which various social factors of home language background, age, gender, socio-economic factors

and area of residence were associated.

Students who performed consistently well on an annual basis and reached completion tended to be those recent school leavers who performed well at school. In particular, the better a student performed at school the more likely they were to finish their university course in the minimum of time. Results also indicated in all courses, the young recent school leavers who had taken the higher level of school English or whose main home language was English, were more likely to have completed their course. These students were also more likely to finish the course within the minimum of time. Although ability and social characteristics were associated with reaching course completion across all courses, course completion in the minimum possible time was associated with ability rather than social factors or student pre-course aspirations. Completion in the minimum of time is in essence an indicator of consistent successful performance, the student choosing to continue within their learning context over time. This association of completion with ability characteristics was evident across most courses and generally provided less support for an interaction between the ability characteristics and learning contexts. Student pre-course aspiration in the form of course preference was not specifically supported as an indicator of commitment in the long term to course completion. However, the social characteristics of students interacted with course contexts to predict course completion unrestricted by time, to a greater extent than predicting course completion within the minimum of time.

Further research into the relationships between characteristics and demographics and their links with academic choices and behaviour outcomes is needed.

A Pathways Theory

Students, diverse in background characteristics and demographics, each with their personal aspirations and appropriate academic credentials, make a choice to commence their study. Further choices are made over time, choices to continue, to transfer, to stop-out or to withdraw. The specific learning contexts of their courses are crucial to the process of making these pathway choices. As students respond to their course context, either choosing to stay or leave their course, temporarily or permanently, the course itself may respond in varying ways to such outcomes. The personal attributes of the students, their course contexts and the academic choices they continue to make over time, form part of an interacting set of circumstances that shape their progression pathways. Findings provide support for the Pathway Model, illustrating the interdependence of personal and social learning contexts of students as they make pathway choices over time following entry to an undergraduate course.

The findings do not support alternative theoretical approaches which focus solely on integration and acceptance of the normative values and behaviours across an institution. Instead, the findings show diverse pathways where the courses are distinct learning contexts. Although there may well be common values as a cultural wash across an institution, the evidence supports campus diversity. These explanations of progression fail to address a number of issues (Cabrera et al., 1993; Pascarella & Terenzini, 1980; Spady, 1970; Tinto, 1993; Weidman, 1989). While a process of academic and social integration may increase student satisfaction and influence commitment and hence completion for some students, this perspective cannot explain the diverse pathway choices that confront students across specific course contexts. The integration approach does not explain variations in student response and outcome within the contexts of courses.

Although acknowledging a bi-directional process of interaction between students and the wider context, the integration approach also underrates the importance of the responsiveness of the learning contexts of courses to student input and outcomes. From this perspective, maintenance of the system is built more upon student acceptance of the normative culture of the institutional environment rather than on *change in response* to specific course contexts.

Courses as separate learning contexts. The findings support consideration of specific courses as separate social contexts within the wider university context. Student profiles of background characteristics and demographics varied across courses and over time within courses. Changes over time in course content, in various aspects of teaching and course requirements, together with change in these student profiles within each learning context over time, indicated change took place in these learning contexts over time. The interaction between the characteristics and demographics of students within different courses, and their varied pathway choices, supported the view that students who commenced the same course responded to their learning contexts differently in terms of enrolment choices and subsequent pathways. Evidence to support a *general* theory of progression would have shown *similar* pathways in each course context. Student performance, retention and completion outcomes would also have been similar for students within diverse course contexts.

Investigation of personal and social factors and the innovative pathways method have presented differential evidence to address the testable hypotheses. Pathway choices can be considered as a response not only to the limits and restrictions but also to the opportunities offered by learning contexts. Students were constrained both explicitly in terms of course guidelines and assessments

and university regulations, and implicitly in terms of the pre-enrolment characteristics and demographics in their initial course choice. Each student made a choice of course but was constrained by prior academic achievement. Academic constraints such as admission criteria, pass levels, course criteria and assessments are defined and re-defined by the university. The course curriculum and assessments sort and filter out students, placing constraints on further participation year by year. Ability characteristics associated with performance outcomes can explain part of this process. Social differences are also part of this explanation. Given similar contextual experiences, students differing in background characteristics and demographics made various pathway choices. By means of these choices involving enrolment and learning context, students moved along the pathways of their university experience with changes in choice resulting in changes in pathway direction.

Learning contexts of courses provided constraints, socially in terms of other students and academically in terms of obligations, responsibilities and requirements. At the same time, they provided opportunities in terms of future directions, both socially and academically, accessible through the range of enrolment choices.

Personal characteristics and social context. Student participation in their course allows a personal perspective of the learning context manifested in subsequent choices. A network of personal and social factors interacting to create a process of change in both personal choice and the social contexts over a period of time was supported. The four-way interaction between student enrolment *choices*, the course *context* and student background *characteristics* over *time* supported a socio-ecological perspective in the Pathways Theory. The

interdependence of the specific social contexts of courses and the impact of personal characteristics and demographics of the students at various points along the pathway following course entry was further illustrated in the application of the pathway model to behavioural outcomes of performance, completion, retention and attrition. Both ability and social characteristics impacted in varying degrees on these behavioural outcomes. Ability characteristics were strongly associated with annual performance outcomes and with achieving completion in minimum time. Various social characteristics have strong links with reaching completion whether in minimum time or longer. However, these social characteristics were prominent in choices relating to retention and attrition. Social characteristics and demographics were associated with pathways that moved in and out of courses over time.

A sense of belonging. Students who remained enrolled or returned to their course following a break are assumed to feel a sense of belonging to their context. Results suggested, particularly in terms of social factors and student aspirations, this related to retention and attrition outcomes. Students' initial aspirations indicating intentions and feelings about their course were revealed to some extent by the preference rating assigned prior to commencement. Within some learning contexts, students who were not in their preferred course tended to leave or transfer early. A possible interpretation suggests that in courses with lower access demand, courses from which an alternative enrolment was possible, enrolled students who showed a preference for the course were assumed to have felt a sense of engagement with the course and remained. Those students who preferred to commence in another course, may have felt at odds with their present course, and chosen to leave, either by not re-enrolling or by transferring out to another

course. This association of student course aspirations and social factors such as socio-economic factors, to educational choices across contexts and across time can be interpreted in terms of a sense of belonging to the context. Lawrence et al. (1992) conceptualised feelings of alienation or engagement with cultural surroundings as individuals contemplated a change in pathway direction. Within a university context, a student's feelings of satisfaction or dissatisfaction with the choice of their course may not necessarily be the result of their performance or course choice alone. However, associations between educational choices and ability factors provided weaker support for interactions with course contexts over time. Although these factors predicted course success or failure at different stages, there was less support for the importance of ability characteristics associated with moving in and out of courses over time. Students may perform well and feel unsettled for other reasons unconnected with their course. The student may have performed well in yearly assessment and wish for a year out of education before continuing. Other students, having done well, may wish to extend their qualifications with another award before continuing in the current course. These feelings may be temporary or more permanent, and may not necessarily be related to performance. Finding a compatible environment undoubtedly contributes to satisfaction and a feeling of belonging. However, from the perspective of academic and social integration theory (Tinto, 1993), compatibility in terms of a normative institutional culture of values and beliefs does not explain the differences in choices and outcomes over time within the context of courses. The findings in this project show that further research is warranted to examine the nuances of implicit and explicit thoughts and feelings of individuals as they make choices to change pathway direction.

Limitations

It is important to note that the findings apply to the particular course contexts within the project. Generalisation is not appropriate particularly in a theory of pathways in context. Tests of significance were used as a device to signal the more meaningful results within the present selection of undergraduate courses and their students. Using course populations, lower frequencies of students within some categories and in some cross-classification cells limited the options for analysis. As a contextual theory, it is clear that direct comparisons were *not* appropriate *between* diverse learning contexts in the Pathways Theory. Conclusions were drawn from predictions of pathway outcomes as well as cross-tabulation and correlation evidence *within* each course. With larger numbers of courses (at least 30) with large numbers of entry students, multilevel modelling would be useful. The range of personal characteristics and demographics of students was also limited by available data. The currency of the data used for this research was not a concern. Assumptions regarding the constantly changing components of the progression model, sit comfortably within constantly changing educational systems.

Although access to population databases was a strength enabling detailed and complete analyses of choices and behaviours over time, separating the behaviour outcomes and the *intrapersonal* processes involved in choice was not possible or appropriate here. Routine application of the Pathway Model with self-report inventories would show where further research would be worthwhile in exploring the complex nature of social and personal interaction in particular learning contexts.

A socio-ecological perspective assumes a reciprocal process of change and influence between the personal and social cultures of individuals. The present

study has responded to one side of this process, the student response to the social culture of the learning context. The other side of this process is considered less immediate, a slower and a more considered response but nevertheless ongoing and open to further study. Faculties and institutions respond in longer time frames and in various ways to student failure, enrolment transfer, longer completion times and non-completion through a necessarily considered response. Forms of the response of learning contexts to student academic choice and outcomes was evident from numerous research publications, government and institutional reviews and recommendations, adjustments to policy, admission criteria and curriculum development (Abbott-Chapman et al., 1992; Barnetson & Cutright, 2000; Jansen, 2004; Power et al., 1987; Ramsay et al., 1998; Richardson & Skinner, 1990; Schmidlein, 1999; Yorke, 1999b, 2000a, 2000b). Yet the level of responsiveness of higher education systems varies. The Australian system appears relatively stable with limited responsiveness. For instance, Bornholt et al. (2004a) point to the limited responsiveness to a year of over-offers in the Australian system in comparison to a more responsive higher education system in Scotland (Paterson, 1992). Australian government reports address quality assurance and management regularly, with reference to student outcomes (Department of Education, Employment, Training and Youth Affairs, 1997; Department of Education, Science and Training, 2001; Department of Education, Training and Youth Affairs, 1997, 1998c, 1999d; McInnis et al., 2000a; National Board of Employment Education and Training Higher Education Council, 1992). There has been a focus in recent years on developing strategies and programs to address problems of attrition, particularly in relation to the transition from secondary school to university (Grayson, 2003; McInnis et al., 1995). McInnis et al. (2000a)

present a comprehensive list of numerous strategies to address non-completion and attrition in the form of preparatory programs, teaching strategies and initiatives, and strategies for minority groups. Further theoretical development would need to account for differential responsiveness at the institutional level to the diverse pathways of students.

In summary

The development and application of the pathway approach using the PISC method has enabled the identification and documentation of longitudinal patterns of progression through a range of learning contexts to produce a model of student progression through undergraduate courses at university. Findings highlighted the importance of the interdependent relationship between the student and their specific learning contexts in undergraduate progression. With many and varied pathways, the journey for many through undergraduate courses was not a straight path to completion. Pathways provided rich experiences as students moved in and out of learning contexts as a consequence of the series of changes in enrolment choices over the years within the constraints and opportunities presented by their context. Within each course context pathways were diverse, with each context itself changing in response to changing student choice over time. The interactions between the personal characteristics of students, their courses and the choices they made over the years underlined the importance of each of the four components of the Pathway Model of student progression - choice, time, context and student characteristics. Associated with each student's place along the time line of progression were the behaviour outcomes of annual performance, completion, retention and attrition as consequential responses of students to their context. The project presents an appropriate, useful and meaningful theoretical framework for understanding how students navigate the Australian higher education system.

CHAPTER 14

CONCLUSION AND IMPLICATIONS

This project makes four main contributions to research on socio-ecological theories in the field of higher education:

- a theoretical framework relevant to the Australian higher education context
- a model of student progression through course contexts
- a method for the identification and documentation of longitudinal pathways of student progression through university degree courses
- evidence of relationships between social and educational characteristics of students, their pathway choices and the behaviour outcomes of academic performance, retention and completion within courses

It is clear that the convention of considering the university across courses as a general context is not appropriate. The findings support a new theoretical approach to considering personal and social factors in educational choice within more specific contexts. Students commencing university are a group of individuals, diverse in background characteristics and demographics. Each student, with their personal aspirations and academic credentials, makes a choice to commence their study. Over time further choices are made, choices to continue, to transfer, to stop-out or to withdraw. The specific learning contexts of their courses are crucial to the process of making these pathway choices. Both the student and these learning contexts change over time. Particular features of students have an impact at different times in different course contexts. As students make ongoing progression choices, the learning contexts of which they are part change accordingly. These contexts have an impact not only in the opportunities and constraints they provide but also in the changing characteristics and

demographics of their constituent student groups. As students respond to the social and academic aspects of their learning context, either choosing to stay or leave their course, temporarily or permanently, the course itself may respond in varying ways to such outcomes. There is an interwoven bond between the personal attributes of the students, their learning contexts and the academic choices students continue to make over time. This forms part of an interacting set of circumstances shaping their progression pathways. From this perspective, the continual construction and re-construction over time of personal views of students in response to their learning context, and the changes in the learning context in response to students, becomes an ongoing cyclical process externalised through enrolment choices and behavioural outcomes. Support for this Pathway Theory is evident in the interactions between the background characteristics of students, their course contexts and their academic choices over time. The model of pathways through undergraduate courses emphasises the crucial place of *course context* in understanding the pathway choices of students and further, in providing the basis for developing strategies to optimise the potential of students in their time at university. Viewing student progression from a theory of pathways provides a framework for addressing academic-related issues.

Using population data, the present detailed longitudinal approach was unique and documented *all* the pathway choices made by a cohort of students as they progressed in and out of their courses over time. Pathways were documented not only to the point of departure from a course but beyond to include the extended pathways of those students who returned to their courses following stop-outs and transfers. The results highlighted the importance of taking a longitudinal approach to explaining individual pathways, of the relevance of the specific

contexts of courses and of viewing differences in pathways and contexts across the years. Understanding the relationship between the personal and social characteristics of students and their specific course contexts, contributes to an understanding of the choice behaviour of students as they negotiate pathways through courses within the broader context of higher education.

Implications

The model offered by the Pathways Theory provides a starting point for research into further understanding the underlying components of choice, context, personal characteristics and time and their place in student progression. The model has implications nationally and locally at *all* levels – the institutional level, the course level and the individual student level.

Further testing of the present method can be undertaken through the application of this model to other higher education institutions. Is this theoretical perspective adaptable to courses within other systems of higher education, to other times in history (using secondary data), to institutions in other cultures? Is this model applicable to other times in more specific situations with fewer choice options, such as before and after the introduction of fees? Does the model reveal a greater or lesser degree of interaction between the underlying components in such situations?

At the student level, an investigation into the integration of the thoughts and feelings of students into the model may be beneficial. A qualitative empirical approach can provide information on the importance and place of student feelings, thoughts and values in the process of negotiating the constraints and opportunities in making their pathway choices over time. What are the thoughts of students as they make the choices involved in changing pathway direction?

At the institutional level, the findings have clear implications for

government and universities in administration, management and policy in higher education. Within a market driven climate with funding concerns, governments in both the UK and Australia regularly publish statistics on student outcomes in higher education institutions (Higher Education Funding Council for England, 2003; Martin & Maclachlan, 2004). Yet student outcome statistics of institutions typically overlook information on outcomes within courses and in particular, long term progression outcomes. Longer term outcomes of student progression through courses provide a vital and more relevant perspective on student progression. In reality, the dilemmas of academic course choice extend beyond the initial choice of an institution and course to the ongoing academic choices involved in navigating through courses over time. A less flexible system will result if diversity and progression within a longitudinal perspective are overlooked. This applies to the use of institutional outcome indicators to address accountability, to inform policy (Higher Education Funding Council for England, 2003), to address quality assurance, and to monitor performance (Martin & Maclachlan, 2004). In particular, statistics relating to access, participation and performance of specific equity groups regularly presented by the Australian government (Department of Education, Science and Training, 2000, 2001; Department of Education, Training and Youth Affairs, 1999a) focus on short-term outcomes and on raising early completion rates. A large percentage of students in this project did *not* proceed straight through their course. While students do leave the system in the early years, the later return and completion of some should not be overlooked.

Although support for educational disadvantage in initial access and participation is to be encouraged, the present findings highlight the importance of effective targeting and the provision of support strategies to expand the range of

academic choice and to improve outcomes in the long term for disadvantaged groups of students. A more flexible system reflecting the diversity of students and the diversity of their pathway choices is needed. A commitment to long term effectiveness of equity policies in relation to progression, a commitment to successful long term participation and wider opportunities for all students, must involve an awareness of the impact of the changing learning contexts of courses on long term choices and outcomes.

It is clear that the gender balance in courses has generally improved over the last decade, particularly in relation to the participation of women, although imbalances remain still in some courses, in particular Engineering, Education and Nursing. Although other considerations such as future wages and employment may be contributing factors to this imbalance, findings suggest that the issue of equality in student progression goes beyond ensuring an initial gender balance at course entry. Although women generally performed well, they performed exceptionally well in the course with the lowest participation of women. Conversely, progression for men was not as successful in courses in which they were under-represented.

Findings also point to continuing educational disadvantage for students from lower socio-economic areas. Recent full-fee options and the availability of low cost student loans are more likely to exacerbate than improve this situation in Australia. The overall range of socio-economic backgrounds in the present study was narrow and higher than the national population average, with differences evident among courses. Findings suggest variation in socio-economic background has implications for enrolment and for retention and attrition at various stages along the progression path within some courses. Although inequality of

opportunity and of access for students from socio-economically disadvantaged backgrounds must continue to be addressed, ensuring an equality of opportunity in the long term is also an issue for student progression. Findings indicated disadvantage also continued for students from rural areas, often also disadvantaged socio-economic areas, and similarly needs to be addressed.

Disadvantage is also apparent among students from community language home backgrounds. Although findings suggest these students appear highly motivated and take less time out from studies in comparison to their counterparts from English speaking home backgrounds, their pathway choices also suggest there is less opportunity and less flexibility in enrolment options. Students from community language home backgrounds tend not to transfer to additional courses or to double degrees. In addition, the lower representation of women from community language home backgrounds in some courses, indicate a gender imbalance among these groups. Together with problems in progression in other courses, findings suggest opportunities for women from community language home backgrounds are limited.

Findings also have implications for raising the awareness of students, parents, school teachers and school advisors to the importance of literacy skills in progression through undergraduate courses. The importance of adequate literacy and communications skills is evident across all stages of progression but more in some courses than others. Findings suggest that not all students at the time of commencing their course have the necessary basic communication skills for smooth progression to completion. The critical importance of these skills at university in some courses has implications across the high school curriculum, and in particular for the advice given in high school to prospective tertiary students

regarding their choice of English level in the final year of school. Taking a longitudinal view from within the contexts of individual courses, results suggest a need to assess English language skills both at entry and also within particular courses across the years. Developing strategies to ensure students' communication skills are effectively promoted and relevant to students' academic disciplines is essential. To ensure student communication skills are adequate for ongoing university study, student support and course development together with professional development to alert academic staff are needed.

There are also implications for school vocational guidance staff for ensuring students make careful and realistic choices among prospective courses (Hesketh & Whitely, 1995). A student must be well informed and give consideration to the scope of their aspirations when allocating their preferences for future university course enrolments. Prospective students need to be aware of possible consequences in undergraduate progression when their expectations and aspirations fail to match the course. Should there be a common non-specialised general first year providing the opportunity for students to find their interests and make realistic choices? Should there be a gap year following high school? Would a more opportune time for the provision of vocational guidance and for the allocation of course preferences be *after* the publication of high school results?

There are also implications for the long term effectiveness of other support services for all students at risk of poor performance or withdrawal. Withdrawal from courses has consequences both for the individual and for the institution. To what extent are 'first year on campus' transition programs effective in the long term in particular courses? Information on the occurrence and timing of repeats, stop-outs and transfers has implications for both faculty teaching and course

administration. The pathway approach can provide information on those who are *not* following the expected paths of progression, who make other choices, who leave the learning context without returning, or who take longer than the minimum time to reach graduation. Do students who change their program of study return? At what point in their candidature do students elect to transfer to another course or to take time out from study? At what stage in course enrolment do students tend to abandon their course? How likely are students to withdraw temporarily after experiencing a failure?

By widening the emphasis on access to include monitoring and support for longer term course objectives, a more effective approach to a monitoring and review process of admissions and equity policies is possible. Equity of opportunity for students at *all* stages of their course progression, opportunities for successful annual performance, for course completion, for choice to leave or remain within a course or to transfer to other courses. Findings indicate disadvantage continues past the point of institutional access through to all stages of *course* progression. University success viewed in terms of first year performance or first to second year retention rates is limited in the information that can be conveyed. The meaning of success in university education could be re-defined to include a more flexible perspective to encompass the diversity of students following their varied pathways. Completion in longer than the minimum time need not necessarily reflect a less than satisfactory progression. Stop-outs and temporary transfers from study may have positive and beneficial effects.

Findings indicate not only the importance of student *aspirations* and *ability* but also the importance of *social* factors within contexts over time, in making academic progression choices and in performance outcomes. Limited by a

current focus on performance *outcomes*, the importance of social aspects within contexts is reduced. What are the implications for social and contextual factors in on-line course delivery and distance education? The present research indicates an extended longitudinal perspective beyond the early years and within the context of courses is essential in order to model the complex pathways that students take through the repertoire of higher education.

With increasing flexibility in opportunities for university study, we need to think clearly about what it means to be a student working towards a degree. What does it mean for diverse students at different places and different stages within the diversified and changing sector globally, within changing boundaries of disciplines, within traditional and virtual learning environments?

Substantial research concerning student progression through higher education considers the institution, the academic unit (faculty or school) or discipline as the unit of analysis. Although this focus can provide information for the administration and organisation of courses and institutions, valuable information on the *progression* of students through their courses is lost or fragmented. The pathways approach, using the individual as the unit of analysis, captures information on performance, retention and course completion for individual students as they move through courses. Accurate knowledge of the pathways that students choose to take through their courses can only be achieved by considering the behaviour of *individuals within the context of their courses*.

This Pathway Model emphasises the importance of:

- a longitudinal approach over a substantial time period
- flexible performance indicators

- recognising complex student choices
- acknowledging the diversity among students
- differences in course context across stages
- acknowledging the diversity of course contexts

This model provides a foundation for change with implications for high schools, for universities and for government. In conclusion, the Pathways Theory provides a theoretical framework relevant to Australian higher education. The Pathways Theory offers a model of pathways of progression through undergraduate courses with practical value for Australian higher education.

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