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School-leavers' Transition to Tertiary Study: A Literature Review

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“School-leavers’ Transition to Tertiary Study: A Literature Review”

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Abstract

The theoretical and empirical literature relating to factors and problems in the transition of students from secondary to tertiary level education is reviewed here. Studies on persistence and attrition, and on the analysis and prediction of academic performance of students, generally and in particular discipline areas, are included.

Keywords: transition to university; student performance.

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Introduction

The problem of the transition from secondary school to the first year at university is not new in Australia – see for example Powell (1979) on transition and Downes (1976) on predicting performance – but the issues change with time. The problem can be devastating for individuals and their families, and it represents an enormous social and economic waste (Pargetter 1995).

The theoretical and empirical literature relating to factors and problems in the transition of students from secondary to tertiary level education is reviewed here. Studies on persistence and attrition, and on the analysis and prediction of academic performance of students, generally and in particular discipline areas, are included. Results relating to first year university entry direct from school are of particular interest, though the literature also encompasses non-standard-entry students as well as other post-secondary institutions. The review includes most of the recent Australian literature, and key works from the plethora of overseas material, particularly from North America, in addition to studies of theoretical models from the education, psychology, sociology, economics, and statistics literature, and of their application in specific discipline areas. It is based on the excellent literature review of Clarke et al. (1994)*, which is augmented, particularly with post-1993 studies. (* denotes an Australian study.)

As noted by Clarke et al., a significant problem related to reviewing this type of literature results from different types of admission policies. Many overseas institutions, particularly in North America, have an open-door as opposed to competitive, and hence selective, admission policy, as was generally the case in Australia until 1998. Another relevant differentiation from Australian universities is the American two-year residential (liberal arts) colleges (where much of the Clarke research has been undertaken).

Theories and Models

Early theories on transition were based in psychology, focusing on individual personal characteristics. From the mid-seventies, the emphasis shifted to sociological factors, and more recently it has focussed on the institutional context and the students' integration.

Tinto's (1975) conceptual model, based on Durkheim's (1961) suicide theory and Spady's (1970) model of the student dropout process, is the most widely recognised and tested. Tinto (1987, 1993) synthesised much research on the theory of student departure, emphasising the role of the institution and social/academic integration of students, particularly the interaction between the students' attributes, skills and dispositions and the institution's academic and social systems. Students' departure was found to be primarily related to isolation and incongruence. Tinto's model has been confirmed by Allen and Nelson (1989), Grossett (1989), Boyle (1989), Halpin (1990), Christie and Dinham (1990) and others. However, Neumann and Neumann (1989) found it a poor predictor, though

possibly useful for freshmen. Pascarella et al. (1983) note that Tinto's model was based in a residential context, but that 'the concepts of person-environment fit, social integration, and institutional commitment operated differently in the commuter institution'. Pascarella (1982) also found the relationship among these concepts was more consistent with 'theoretical expectations in the residential and liberal arts samples than in the two- or four-year commuter samples.'

Bean's (1980,1982,1985) and Bean and Metzner's (1985) theories and models of student departure, which emphasise the influence of the external environment more than social integration factors, are particularly applicable to non-traditional students. Related studies include those of McCaffrey (1989) for distance education, Stahl and Pavel (1992), Eaton and Bean's (1993, 1995) model of attrition based on attrition/avoidance behaviour, Azjen and Fishbein's (1975) model (c.f. Koslowsky 1993, Carpenter and Fleishman 1987*), Brewer's (1992) life-task model, and Pascarella's general model for assessing change. Cabrera et al. (1992, 1993) examine empirically 'the convergent and discriminant validity' of the theoretical models of Tinto and Bean.

Learning models of academic performance are used in the economic literature. These educational 'production function' models relate output (in terms of value added or absolute achievement) to input (in terms of students' ability, background, interest and effort, and instructional input).

Analyses

Research has been extensive and varied, generally focusing on specific aspects of transition, persistence and academic performance in particular contexts. Some common themes and factors emerge from the literature, but variations in findings occur in different countries and cultures and by disciplines, institutions and student categories, as do conflicting results due to theoretical and methodological issues (Anderson 1987; etc).

Studies have been undertaken in a range of countries:

- USA – Tinto, Pascarella, Terenzini, Astin etc, Gutierrez-Marquez (1994) (10,000 students), Gillespie and Noble (1992);
- Canada – Sarkar (1993), Sweet (1986), Anderson et al. (1994);
- UK – Goldstein, Thomas, Rabash, Raudenbusch etc., Hadley and Winn (1992), Gramlich and Greenlee (1993);
- Israel – Koslowsky (1993), Ben-Shakar and Kiderman (1996);
- Asia – Kember et al. (1991) in Hong-Kong, Tay (1994) in Singapore, Pongboriboon (1993) in Thailand;
- Australasia – Anderson (1959, 1960, 1972)*, Keef (1992) in New Zealand;
- Australian studies, indicated by *, include: Dobson et al. (1996)*, Dobson and Sharma (1995)*, Shah and Burke (1996)*, Calderon (1997)* in Victoria, Long et al. (1995)*, Lewis (1994)*, Clarke et al. (1994)*, Everett and Robins (1991)*, Elsworth et al. (1982)*, Watkins (1979, 1981, 1982)*, Abbott-Chapman et al. (1992)* in Tasmania, McClelland and Kruger (1993)* in Queensland, Clark and Ramsay (1990)*, Power et al. (1986, 1987)* and Linke et al. (1985)* in South Australia, Watkins (1979-1986)*, Stevens and Walker (1996)*, Jackson (1997)*.

Large scale studies include:

- Gutierrez-Marquez (1994), Gillespie and Noble (1962) (6000), Anderson et al. (1994) (7000), Clark and Ramsay (1990)* (7000), Dobson et al. (1996)*, Shah and Burke (1996)*, Calderon (1997)*.

Some studies have focussed on specific discipline areas:

- Nursing – Care (1995), Burgum et al. (1993)*, Benda (1991);
- Medicine – Tutton and Wigg (1990)*;
- Law – Bradsen and Farrington (1986)*;
- Education – Hart (1992)*;
- Geography – Walmsley (1990)*;
- Physics – Brekke (1994), Young (1991)*, Bailey et al. (1989), Logan and Bailey (1983), O’Halloran and Russell (1980), Dale and Jennings (1986)*;
- Science – Young (1991)*, Kidd and Naylor (1991), Warwick-James (1994)*;
- Engineering – Stone (1988);
- Mathematics – Umoh et al. (1994), Pongboriboon (1993), Wood and Smith (1993)*, Watson (1988)*;
- Statistics – Smith et al. (1994)*, Thompson and Smith (1982)*, Magel (1996), Jackson (1997)*;
- Computing – Flitman (1997)*;
- Accounting – Ramsay and Baines (1994)*, Auyeung and Sands (1993)*, Bouillon and Doran (1990, 1992), Danko et al. (1992), Keef (1992), Dinius (1991), Farley and Ramsay (1988)*, Norton and Reding (1992), Nourayi and Reding (1992), Nourayi and Cherry (1993);
- Economics – Douglas and Sulock (1995), Milkman et al. (1995), Stratford and Sulock (1995), Anderson et al. (1994), Brasfield et al. (1993), Williams et al. (1992), Dancer and Doran (1990)*, Siegfried and Fels (1979), Siegfried and Walstead (1998), Tay (1994), Ferber et al. (1983), Heath (1989), Horvath et al. (1992), Lumsden and Scott (1983, 1987), Palmer et al. (1979);
- Management – Hadley and Inn (1992);
- Business/Commerce – Hand and Fry (1995)*, Tay (1994), Ashar and Skenes (1993), Pharr et al. (1993), Cheng (1991)*, Wright and Palmer (1994), Stanley and Oliver (1994)*.

Some studies have focused on study mode or student type:

- Distance Education – Care (1995), Long (1994)*, Kember (1989, 1990), Kember et al. (1991), Stone (1988), Sweet (1986), Eisenberg and Dowsett (1990), McMahan (1990)*;
- Adults – Duke (1987), Farabaugh-Dorkins (1991), Ashar and Skenes (1993), Munn et al. (1994), Dirk and Jha (1994);
- Disadvantaged – Fox (1994, 1986), O’Dowd (1996), West (1985)*;
- Minority groups – Pavel (1991), Levin and Levin (1991), Kiang (1992), Castle (1993), Dobson (1995), Kramer (1993), von Destinon (1985), Price et al. (1992)*, Lewis (1994)*, McJamerson (1992)*, Nora (1987), Norman and Norman (1995).

Types of comparative analysis:

- Progress rates – Dobson et al. (1996)*;

- Simple correlations – McClelland and Kruger (1993)*, Myers and Pyles (1992);
- Chi-squared analyses to more sophisticated regression analysis – West et al. (1986)*;
- Multiple linear regression – Auyeung and Sands (1993)*, Elsworth and Day (1983)*, Munro, (1981);
- Non-linear – Salemi and Tauchen (1982);
- Logistic – Benso (1991), Everett and Robbins (1991)*, Gillespie and Noble (1992), McClelland and Kruger (1993)*, Becker and Salemi (1977);
- Probit – Spector and Mazzeo (1980), Dey and Astin (1993) ;
- Logit – Dey and Astin (1993);
- Multinomial logit – Park and Kerr (1990);
- Discriminant analysis – Hamdi et al. (1991), West et al. (1986)*;
- Path analysis – Farabaugh-Dorkins (1991), Munro (1981), Murray-Harvey (1993)*, Pascarella and Terenzini (1983);
- Neural networks – Flitman (1997)*;
- Causal modelling – Elsworth and Day (1983)*, Mencke et al. (1988), Stage (1987);
- Structural equation analysis – Cabrera et al. (1993), Kuh and Vesper (1991), Minnaert and Janssen (1992);
- Educational production functions – Jackson (1997)*, Douglas and Suloch (1995), Becker and Salemi (1977), Salemi and Tauchen (1980), Becker (1977, 1982), Modk (1959), Anderson et al. (1994), Siegfried and Fels (1979), Hanushek (1979);
- Multilevel statistical modelling – in secondary schools’ effectiveness studies – Young (1991)*, Goldstein (1995), Goldstein and Spiegelhalter (1996), Goldstein and Thomas (1996), Goldstein et al. (1996), Deely and Smith (1998), Thomas and Mortimore (1996), Woodhouse et al. (1996), Hill (1995)*, Raudenbusch and Willms (1995), Thomas et al. (1995), Tymms (1995), Seltzer (1994), Rabash and Goldstein (1994), Paterson and Goldstein (1991), Raudenbush et al. (1991) – and ‘value-added’ measures at university level – Hadley and Winn (1992).

Criticisms of methodologies include Braxton et al. (1988), who suggest that data from *post hoc* studies should be treated cautiously. Similar issues have been raised in Pascarella (1988), Terenzini and Pascarella (1990), Johnes and Taylor (1990), McPherson and Paterson (1990), Levin and Levin (1993)*.

Factors Identified as Significant

Transition is complex, and varies according to several factors and their interaction. This is evidenced in the following review, as is the divergence of findings. Calderon’s (1997)* recent large-scale Monash comparison of student progress-rates identifies the stereotypical successful student in terms of personal characteristics such as gender, socioeconomic status and school background, and shows that these vary by faculty. Following Clarke et al. (1994)*, variables identified as relevant in the literature are grouped in categories.

(i) Student Demographic Characteristics

Age

A variable for age is included in most studies, but the results are mixed, partly due to analytic problems of definition and control. For example, sometimes analysis includes 'mature age' students, a variable which often but not necessarily includes students without 'normal entry' qualifications (see McClelland and Kruger 1993)*. With increasing alternative entry pathways to higher education, a variable based on entry type is more appropriate in such cases. Maturity is suggested as a factor in student success: hence the argument for deferring university studies for a year after secondary school. Linke et al. (1985)* found that 5000 deferring South Australian students generally perceived deferring as 'valuable personal experience with relevance also to their ability to cope with subsequent studies', but also that deferment acts as a filter, diverting female non-metropolitan students from entering higher education.

Age appears to have little predictive power in some studies for success (e.g. Kuh and Vesper 1991, McClelland and Kruger 1993)* or persistence (e.g. Gillespie and Noble 1992, West et al. 1986)*. Farabaugh-Dorkins (1991) in a study of adult (over 21 years) freshmen, found that dropping out most correlated with intent to leave, GPA and goal commitment. [See Clarke re age]. However Clark and Ramsay (1990)* found age correlated with performance in most institutions and courses. Siegfried and Walstead (1990) indicate that age has a positive effect on performance in economics. However, Anderson et al. (1994), controlling for vintage in a large Toronto study, found significant differences across sessions and campuses, and that after 25 years higher ages begin to have a positive effect. [Hong (1982, 1984) also considered the age factor in predicting success.]

Shah and Burke's (1996)* national Australian study using input-output analysis found a 20 year old commencing student has the highest chance of completing a course, and that the difference in probabilities varies with the commencement of age.

Linguistic and Cultural Background

Non-English Speaking Background (NESB) is used sometimes as an indicator of ethnicity (Winefield et al. 1990). North American research variously indicates that ethnicity either influences success (Myers and Pyles 1992) or has no effect (Benson 1991, Kuh and Vesper 1991), and also either affects persistence indirectly (Munro 1981, Pascarella and Terenzini 1983) or has no effect (Gillespie and Noble 1992, Kuh and Vesper 1991). Stage (1987) noted that majority students are likely to be more academically integrated. Australian research appears more clear cut. Aboriginal and Torres Strait Islander (ATSI) students have been consistently reported as being less successful (McClelland and Kruger 1993)* and less persistent (Abbott-Chapman et al. 1992)*. Price et al. (1992)* studied attrition in the Northern Territory.

Asian students tend to enter (Winefield et al. 1992) and to persist (Abbott-Chapman et al. 1992*, West et al. 1986)* in tertiary education disproportionately,

but to have more problems with their institutions, their courses and with not being academically prepared (West et al. 1986)*. Tay (1994) found performance in economics in Singapore different according to ethnic background. Birrell's (1994)* Monash study indicates Greek and Asian students have a high entry and low attrition rate, and discusses the issue of family support and motivation. Other studies of equity groups include Lewis (1994)*, Dobson and Sharma (1995)* and Levin and Levin (1993)*.

Gender

In some studies gender did not appear to predict performance (Benson 1991, Murray-Harvey 1993*, Tutton and Wigg 1990)* or persistence (Gutierrez-Marquez 1994, Gillespie and Noble 1992, West et al. 1986)*. However females dominated males in performance in the following studies: Everett and Robins (1991)*, Hamdi et al. (1992), Abdulrazzak and Nada (1992), Clark and Ramsay (1990)*, McClelland and Kruger (1993)*. Females also dominated males in persistence in the following studies: Hamdi et al. (1992), Munro (1981), Pascarella and Terenzini (1983), Clark and Ramsay (1990)*, Tinto (1993).

Clarke et al. (1994)* considered that these mixed results can be attributed to confounding factors and methods of analysis, and that any interpretation must avoid being simplistic. For example, Abbott-Chapman et al. (1992)* found attrition risks greatest for able females, while West et al. (1986)* found different motivations for dropping out by gender, but no quantitative differences. Pascarella and Terenzini (1983) found an overall indirect gender effect on persistence through initial institutional commitment, but separate analyses revealed that different male and female behaviour could be explained differently. Elsworth and Day (1983)* found females less likely to take courses offered to them from choices of secondary subjects in science, or based on their perceptions of career advantages.

Shah and Burke (1996)* found that, overall, females have a higher chance of completing a course, and take less time to complete it, than a male of the same commencing age. However, though generally true, the opposite holds in some cases in some discipline areas – e.g. males in Business, Law and Engineering. In general, females have a higher chance of completion in Architecture, Arts, Education, Health and Science. The pattern appears less uniform across other ages for other areas.

Significant differences have been found in some discipline areas. Much recent empirical work has been done in Economics, a subject where failures and attrition are high (e.g. 60% in Toronto). Males appear more persistent than females in Economics subjects (Anderson et al. 1994, Douglas and Sulock 1995). Males also have been found to perform better than females in economics by Heath (1989), Ferber et al. (1983), Lumsden and Scott (1981), Tay (1994) (in Singapore), and Anderson et al. (1994), but not by Douglas and Sulock (1995), who suggested that previous findings of a significant gender effect may be the result of sample selection bias. Interestingly, Anderson et al. could not duplicate their result in other commerce or mathematical subjects. Differences appear to depend on particular course components in disciplines such as Accounting (Bouillon and Doran 1992, Ramsay and Baines 1996*, Nourayi and Cheney 1993), Economics (Siegfried and Walstead 1990), and styles of assessment (Lumsden and

Scott 1987, Williams et al. 1992). Some other studies omitted gender, although it might have been relevant (Auyeung and Sands 1993*, Minnaert and Janssen 1992). Other studies include Clark and Ramsay (1990)*, Bean and Vesper (1994), Dobson and Sharma (1995)* and Goldstein (1996).

Student Entry Category/School Type

The North American literature is inconclusive on the relevance of type of school to persistence (e.g. Gillespie and Noble 1992). In Australia students from government schools generally appear less likely than those from non-government schools to enter tertiary education (Elsworth and Day 1983)*, but more likely to persist (Abbott-Chapman et al. 1992*, West 1985)* and also to perform (Abbott-Chapman et al. 1992*, West et al. 1986)*, except in the Tutton and Wigg (1990)* study of medical students.

Although the focus here is on school to university transition, special entry is an increasing category in many tertiary institutions. Hitherto this variable was rarely included in studies because of the small numbers involved. This will change in at least some institutions with the increasing emphasis on recognition of prior learning and credit transfer, the expansion of pathways to tertiary education, and lifelong learning. McClelland and Kruger (1993)* in their study of the 1990 Queensland tertiary admissions cohort, found tertiary performance slightly negatively correlated with tertiary entrance index and performance for a group of 119 'mature age' students (here indicating a lack of formal qualifications). They also found that compared with regular school entry students, students with previous post-secondary qualifications (particularly other tertiary rather than TAFE) were more successful, but students previously excluded from tertiary institutions less successful. Dobson and Sharma (1995)* and Lewis (1994)* also examined equity groups.

Socioeconomic and Socioeducational Status

Relationships between indices of socioeconomic status (SES) and tertiary entry, performance and persistence are discussed in a comprehensive literature review by O'Dowd (1997)*. Higher SES students have been found to have an increased probability of gaining entry (Winfield et al. 1992), achieving success (McClelland and Kruger 1993*) and persisting (Munro 1981, Scott et al. 1992, Astin 1993, Lewis 1994*). Most of those withdrawing for financial reasons were from low SES backgrounds (West et al. 1986)*. However Gutierrez-Marquez (1994) found that family income was not relevant to success, and a review of economics education, Siegfried and Fels (1979), found that socioeconomic background did not seem to matter much.

Some studies focused on parental education, but it was not found to be a significant factor by Gillespie and Noble (1992) or Pascarella and Terenzini (1983). It has been used as an indicator of socioeconomic status (e.g. Pascarella and Terenzini 1983, West et al. 1986)*. Young (1991)* found a composite measure of socioeducational level, parental occupation and education, and number of books in the home had a significant effect, using multilevel analysis.

Location – Home and Residential

Elsworth and Day (1983)* found that rural students were more likely to decline tertiary place offers. This could be related to a financial support factor. A location variable can be a concomitant of others, such as: socioeconomic status, where home postcode is often used as an indicator (McClelland and Kruger 1993)*, financial support (e.g. West et al. 1986* found a significant number of students attributing finance for deciding to withdraw or transfer to an institution nearer home), and social integration. Tinto (1987) found 'external community pivotal to off-campus students'. Terenzini and Pascarella (1982), after controlling for other characteristics, found the residence unit context appeared to relate to persistence among males but not females. Any analysis of overseas versus local students may be confounded by this factor.

(ii) Student Psychological Characteristics

Academic Preparedness, Learning Strategies and Locus of Control

Significant numbers of students who voluntarily withdrew from full-time study cited unsatisfactory study skills and a lack of important pre-requisite knowledge as reasons (West et al. 1986)*. Studying and learning approaches at tertiary level appear to be strongly influenced by practices at secondary school level (Ramsden 1991, Ramsden et al. 1989)* and a mis-match may create problems.

Achievement was found to be best explained by metacognitive ability by Murray-Harvey (1993)* using a cluster of ten variables including age, gender and psychological characteristics. Van Rossum and Schenk (1984) found that achievement was generally comparable for questions involving knowledge, but was higher for students using a deeper approach to learning when insight was required. An internal (sense of control of one's own behaviour), rather than an external (control by others or fate), locus of control, has been shown to increase the likelihood of entering tertiary education (Winefield et al. 1992) and indirectly affect performance (Murray-Harvey 1993)* and persistence (Munro 1981). However Wilhite (1990) found that student/academic performance is affected by the external locus of control, and West et al. (1986)* that students with dominantly an extrinsic motivation are more likely to persist than withdraw.

From the limited relevant literature available, students' performance is clearly related to their own concepts of their academic ability (Murray-Harvey 1993*, Wilhite 1990, Watson 1988* (in mathematics)). Watkins (1978-1986)* and colleagues focussed on the effects of students' personalities and attitudes, the nature of institutions and different faculties, disciplines and learning environments on student learning, study approaches and adjustment.

Goal Commitment

Students' goals for tertiary study are an important factor in persistence, as shown by Mutter (1992), Webb (1989), Preston (1993) and Sarkar (1993). Such

goals appear to have a direct effect (Gillespie and Noble 1992, Pascarella and Terenzini 1983, Allen and Amaury 1995 (one factor only)), or an indirect effect (Munro 1981, Bean 1985, Pascarella and Terenzini 1983). The influence appears to vary: greater during the earlier years (Bean 1985); more direct for females but essentially indirect for males (Pascarella and Terenzini 1983). Warwick-James (1994)*, using a national longitudinal data base, found that a clear career goal was correlated with retention, whereas Lewallen (1993) found no evidence that students who were undecided about a choice of career or major study area had a greater potential for non-persistence.

Munro (1981) found students' goals appear to be strongly influenced by their perceptions of their parents' attitudes and goals for their tertiary education. Munro (1981) also demonstrated that self-esteem indirectly influences performance through institutional commitment and satisfaction with academic activities, etc. Students' stated intention is consistently the strongest predictor, whether of persistence (Bean 1982, 1985, Cabrera et al. 1993) or dropping out (Farabaugh-Dorkins 1991).

Academic Motivation

The academic orientation and motivation of students has been found to be a significant predictor of performance and persistence by Abbott-Chapman et al. (1992)*, Hughes and Wyld (1986) and West et al. (1986)*.

Siegfried and Walstead's (1990) survey of economics students indicated study effort was positively related to student performance, whereas their earlier study (Siegfried and Fels 1979) did not. Tay (1994) found that preparation for class, and Romer (1993) attendance at class, were important for the final performance of students.

(iii) Student Prior Performance

Admission to Australian tertiary institutions on the basis of academic performance is determined according to one index or some combination of indices, such as secondary school results or ranking (overall or in specific subjects), the score of some form of scholastic aptitude test, school recommendations, and other relevant experience or submitted folio of work. Research, in Australian and overseas, consistently indicates that secondary school subject results invariably are strong direct predictors of tertiary performance.

Prior Academic Performance – Overall

A tertiary entrance index, using a sometimes complex combination of secondary school and scholastic results, appears a strong predictor of performance. This is demonstrated in Abbott-Chapman et al. (1992)*, Auyeung and Sands (1993)*, Bean (1985), Benson (1991), Hamdi et al. (1992), McClelland and Kruger (1993)*, Clark and Ramsay (1990)*, and Power et al. (1987)* for performance, and for persistence in Abbott-Chapman et al. (1992)* and Gillespie and Noble (1992). Its validity, however, may decrease over time (Clark and

Ramsay 1990*, Schofield 1989)*. See also Myers and Pyles (1992). In Singapore, Tay (1994), in contrast to all previous studies elsewhere, found overall ability or intelligence to be insignificant, but noted that this may be the result of examinations focusing only on material taught rather than on student ability, or of the homogenous high quality of the student cohort.

Prior Academic Performance – in Subjects

Many studies, including Abbott-Chapman et al. (1992)*, Auyeung and Sands (1993)*, Bean (1985), Benson (1991), Hamdi et al. (1992), McClelland and Kruger (1993)*, Minnaert and Janssen (1992), and Myers and Pyles (1992), found prior academic performance a strong predictor of persistence, both direct (Gillespie and Noble 1992, Minnaert and Janssen 1992) and indirect (Pascarella and Terenzini 1983).

Some studies distinguished between performance in, and undertaking, subjects at school. Minnaert and Janssen (1992) note that students' domain-specific knowledge relates to their intrinsic motivation to study a subject, which also relates to their course preference and their academic preparedness. Consistently, the predictive power was more obvious for the science disciplines (McClelland and Kruger 1993)* and decreased in later years (Abbott-Chapman et al. 1992*, Auyeung and Sands 1993*, Farabaugh-Dorkins 1991, McClelland and Kruger 1993*, Gutierrez-Marquez 1994).

Secondary economics is related to tertiary economics performance in Hyann and Waddell (1990) and Lumsden and Scott (1987), but not in the reviews of Siegfried and Fels (1979) and Siegfried and Walstead (1990) of mainly US studies, whereas Anderson et al. (1994) found the relationship complex, and a positive relationship only for relatively successful secondary students. An early study by Downes (1976) found secondary school performance in economics and mathematics significant in explaining first year performance in all subjects in the Economics faculty at Monash, using data from both the mid 60s and 1972, a result confirmed in this current study for the same cohort in 1996 and 1997.

Scholastic Aptitude

The most commonly used measures are the Scholastic Aptitude Test (SAT), All Australian Scholastic Aptitude Test (ASAT) and the American College Testing Program (ACT). Various measures of scholastic aptitude directly predicted tertiary performance (Bean 1985, Benson 1991, Everett and Robins 1991*, Horn et al. 1993, McClelland and Kruger 1993* (weakly), Myers and Pyles 1992). Such means appear to reflect persistence both directly (Gillespie and Noble 1992) and indirectly (Pascarella and Terenzini 1983). Everett and Robins (1991)* found the ASAT quantitative test comparable to the total tertiary admission index in the University of Western Australia for both humanities and science students. Jenkins (1992) concluded it should be used only as a supplement to secondary school Grade Point Average.

Tertiary Offer

The rank of final offer accepted has been shown to directly influence performance (McClelland and Kruger 1993)* and persistence (West et al. 1986)* in Australia, and to influence persistence indirectly (Pascarella and Terenzini 1983) in the US. Anecdotal evidence suggests that satisfaction with offer, which also relates to rank of offer accepted, may influence persistence. Stage and Ruskin (1993) linked the student college choice and persistence literature. Tertiary course choice has been explored by Kidd (1992) and Kidd and Naylor (1991).

(iv) Social Factors

Family and Peer Support

Family support influenced students' commitment to the institution and course satisfaction (Cabrera, Nora and Castaneda 1993) and was an important factor in persistence for a small sample of waverers (West et al. 1986)*, though West found that a few withdrew because of the difficulty of combining study with family commitments and needs. Terenzini (1992) noted that families can be either a supportive asset or a source of stress as relationships change. Parental encouragement related more to satisfaction for males (Bean and Vesper 1994).

Peer support and relationships have been found to enhance persistence of students both directly (West et al. 1986*, Pascarella and Terenzini 1983, Mutter 1992) and indirectly (Cabrera et al. 1993, Munro 1981, Pascarella and Terenzini 1983), although Gillespie and Noble (1992) and Kuh and Vesper (1991) found that it was not a significant predictor of persistence. Pascarella and Terenzini (1983) and Bean and Vesper (1994) found that the support of friends was more relevant for females, whereas academically-oriented factors were more influential in males' decisions. School friends were a facilitating or a complicating transition influence depending on whether they attended the same institution or not.

Study Mode

McClelland and Kruger (1993)* found no difference in the performance of part- and full-time enrolled students, but Kuh and Vesper (1991) found that the range and quality of academic activities available to each group were different. [Metzner and Bean (1987) discussed the dropout of commuter and part time students.]

Long's (1994)* results confirm previous findings that distance education students are more likely than on-campus students to withdraw, but that their academic achievement was comparable in later years although marginally lower in first year. [See also McCaffrey (1989) and Sweet (1986) on distance education, and also Care (1995).]

Financial

Financial matters generally appear to have a small but significant effect on persistence either directly (e.g. Webb 1989), or indirectly via goal commitment (Cabrera et al. 1990), or not at all (Gillespie and Noble 1992). Withdrawers gave financial problems as the most important reason in West et al. (1986)*, and third reason in Abbott-Chapman et al. (1992)*. West et al. (1986)* found that, compared to withdrawers, persisters relied on casual employment more than on family financial support. Anecdotal evidence suggests that increasing numbers of students are involved in casual jobs. Gutierrez-Marquez (1994) found weekly job hours negatively correlated with success. [See Green and Jacques 1987, Tierney 1992, Astin 1992.] Bean (1985) found a direct relationship between persistence and financial support, whereas Cabrera et al. (1993) found an indirect relationship through course satisfaction and institutional commitment. Tinto (1995) 'found it more often cited as a reason by SES students'.

(v) Institutional Factors

Pascarella et al. (1986) found that persistence was affected by person/environment fit (which had the most salient influence), measures of academic and social integration (which had the most direct effect), and student pre-college characteristics (which had the most indirect effect).

Institutional Commitment

Overseas research has found that 'institutional commitment' is a factor which influences persistence (Cabrera et al. 1993, Munro 1981, Kuh and Vesper 1991). Some have distinguished between 'initial' and 'subsequent' institutional commitment: Bean (1982, 1985) found initial commitment strongly influential, particularly in the second year, whereas Pascarella and Terenzini (1983) found subsequent commitment most directly influential, and in turn directly influenced by initial commitment. Gender differences were observed: Stage (1987) found that institutional commitment appears to be more related to persistence for females, as did Allen and Nelson (1989) (and directly affected by social integration), whereas Pascarella and Tinto found it to be more of an influence on the subsequent commitment of males.

Clarke et al. (1994)* suggest that, although the perceived goals or vision of the institution and student/institution fit appear important in some of the literature, on reflection these factors appear to represent a disparate combination of goals, which are addressed in other variables such as institutional commitment, personal and social orientation of the institution, perceived value of the course and course characteristics and faculty contact.

Academic Integration

Academic integration, or out-of-class contact with faculty staff related to academic activities, has been found to be a significant predictor of persistence by Gillespie and Noble (1992). This has been confirmed by Mutter (1992), Stage

(1987), Pascarella and Terenzini (1983), particularly for males' persistence, and Towles et al. (1993) for distance students (especially freshman) with faculty-initiated contact. See also Pascarella et al. (1986). However, Bean and Vesper (1994) and Bean (1995) found that faculty contact did not appear significant at a large US research university. The quality of the interaction was observed to be more important than the frequency by Pascarella et al. (1983). West et al. (1986)* found 14% of withdrawers described teaching staff as uncaring or uninterested.

Social Integration

Bean's (1985) faculty contact variable included both social and academic contact. Stage (1987) found that social integration was likely to be higher the higher the academic integration. Students' perception that academic and administrative staff provide for their personal and social needs appears to positively influence persistence both directly and indirectly, particularly for females (Bean and Vesper 1994, Pascarella and Terenzini 1983, Pascarella et al. 1986, Cabrera et al. 1993, West et al. 1986)*. Munro (1981) and Allen and Nelson (1989) found these qualities influenced institutional commitment.

The literature on mentoring has been reviewed by Jacobi (1991), and Muckert et al. (1996)*. Life on campus and extra curricular activities appear to enhance student integration (Christie and Dinham 1990). This factor may be confounded with term residence. Other relevant studies include Astin (1993), Tinto (1995), Kuh (1993, 1995), Astin (1993) (for counselling, support services), Braxton et al. (1995), Eaton and Bean (1995) and Stevens and Walker (1996)*.

Course Expectations/Characteristics

A mismatch between prior expectations and actual experiences was found to be a significant reason for withdrawing by Abbott-Chapman et al (1992)*. West et al. (1986)*, Braxton et al. (1995), Power et al. (1986)* found that low commitment and withdrawal were often the result of inadequate counselling and decision making about university courses. King (1992) also stressed the central role of academic advising on retention. Glass and Garrett (1995) found that orientation courses improved retention, as did Sendman (1991) for the third but not the first semester, but did not result in significantly higher GPAs. Terenzini et al. (1993) found that faculty involvement was important in orientation. They also found a need for parents' involvement. Other studies include Frost et al. (1991), ERIC *Digest on Academic Advising*, Upcraft et al. (1995), Price et al. (1992)*, and Clark and Ramsay (1990)*.

A perceived lack of relevance was found to be a significant factor in dropping out in some Australian studies (Abbott-Chapman et al. 1992*, West et al. 1986)*. Overseas, Bean (1982, 1985) found course 'utility' a significant indirect predictor of persistence, and Kuh and Vesper (1991) found that student effort related to the practical values associated with courses.

Nature of Course

Findings sometimes vary according to the discipline area, which can also relate to prerequisite knowledge. Success in science subjects has been found to be better predicted than in the humanities by the total ASAT test (Everett and Robins 1991)* and by performance in relevant school subjects (McClelland and Kruger 1993)*. Shah and Burke's (1996)* input-output analysis found that students have the least chance of completing Engineering and most of Law once enrolled, noting that Medicine is probably similar to Law but they could not model it.

Teaching/Pedagogy

The level of student satisfaction with the teaching and learning activities provided by the institution has been found to predict persistence, both indirectly by Bean (1985) and directly by West et al. (1986)* (where withdrawers cited little encouragement or enthusiasm) and by Abbott-Chapman et al. (1992)*. The latter's sample of withdrawers ranked this factor as the fourth most important reason, also citing uncaring and uninterested teaching staff, an unsuccessful or inadequately supportive tutoring system, large and impersonal classes, and poor facilities. Important aspects of teacher behaviour were identified by Care (1995) in a qualitative Canadian study of distance education nurses. Elliott's (1992) interviews identify a link between behaviour of faculty and student persistence.

Persistence has been found to be slightly higher and performance better for first-year students in learning communities than in traditional classes. Collaborative learning has been discussed by Tinto (1993), Tinto and Love (1995), and 'freshman interest groups' by Tinto and Goodsell (1993, 1993, 1994), Tinto and Russo (1994), Tinto et al. (1994), and Tinto (1995).

Douglas and Suloch (1995) suggested their results provide some basis to evaluate the effectiveness of methods of teaching. Their results support the importance of homework, and indicate that homework and class attendance are similar in production of good grades. In surveys of economics education, Siegfried and Fels (1979) found that class size and textbooks are not significant for performance, and Siegfried and Walstead (1990) found that a good match between students' learning style and instructors' teaching style had positive effects, but both found that having a graduate student instructor was not relevant. Tay (1994), in a relatively controlled experimental environment, found that effects relating to the type of instructor (graduate assistant, tutor, lecturer, foreigners) were significant in performance for Economics in Singapore, and suggests contrary US findings of Watts and Lynch (1989) resulted from language ability, not cultural effects.

For distance education, see Biner et al. (1995) on the use of television classes, and Stone (1988) who cites research showing no significant difference in performance of on-campus and off-campus Engineering graduate students in video courses. Also see Long (1994)*, Lumsden and Scott (1983) on the efficacy of innovative teaching techniques in Economics in the UK, and Becker and Salemi (1977) on testing the effectiveness of audio-visual tutorials.

Administration

Bean (1982, 1985) found that the opportunity to transfer to another university directly influenced persistence, and West et al. (1986)* found that 15% of withdrawers indicated that the administrative arrangements of the institution were too inflexible.

(vi) Outcomes

Most of the literature uses outcomes related to academic performance in terms of grades, pass rates etc, and persistence/attrition. The latter two terms are generally (but not always) defined in terms of voluntary withdrawals, rather than failures or exclusions. A few outcome measures relate to students' intellectual development or personal and social development (Kuh and Vesper 1991, Volkween 1991, Terenzini and Wright 1987, Pascarella and Terenzini 1983).

Longitudinal research studies often employ some of these outcome variables as predictors for later years. Results in the earlier years often predict subsequent performance (Abbott-Chapman et al. 1992*, Auyeung and Sands 1993*, Farabaugh-Dorkins 1991, McClelland and Kruger 1993)* and persistence, both direct (Bean 1982, 1985, Cabrera et al. 1993, Gillespie and Noble 1992, Pascarella and Terenzini 1983) and indirect (Pascarella and Terenzini 1983). Intellectual development has been shown to have both a direct and indirect effect on persistence (Pascarella and Terenzini 1983).

Institutional Actions

Gillespie and Noble's (1992) study of 6000 students in five institutions supports Tinto's view that persistence models are specific to individual institutions and the time period examined. They discuss the need to identify high-risk students and develop intervention strategies targeting key factors related to student retention.

Relevant literature includes Tinto's (1993) major monograph, Cohen's (1994) *ERIC Digest on Indicators of Institutional Effectiveness*, Price (1993) on intervention strategies, Abbott-Chapman et al. (1992)*, Terenzini's et al. (1993) suggestions for transition, and Henry and Smith's (1994) system-wide effort in Colorado to develop a framework for student persistence and success. Davis and Murrell's (1994) work on the role of student responsibility in collegiate experience discusses institutions' role in encouraging this. See also Upcraft, Lee and Kramer's (1995) book on academic advising, and 'CollegeEdge eases the transition from H.S. to college' http://www.collegeedge.com/TBL_HOME.HTML.

Overview

Research on transition, attrition and performance in tertiary education is extensive, as can be seen from this bibliography.

Research studies and applications based on different theoretical models can be found in the education, psychology, sociology, statistics and economics literature. Transition and attrition research studies are mainly from the USA, but also from the UK, Canada, Israel, Hong Kong and Australia. Much research since 1975 has been based on particular theoretical models, such as those of Tinto, Spady, Bean, and on their empirical validation by Terenzini, Pascarella and others, both generally, and in particular contexts.

In general, these studies suggest that transition and persistence are related to background characteristics, disposition on entry, goal commitment, experiences after entry – including academic and social integration – and external and institutional factors. Methodological issues arise as to how these can be measured and tested. Research indicates significant differences in the sources and frequency of difficulties in different groups of students, depending on factors such as their academic and social background, and personal and personality characteristics. Other factors involve the nature of the institution – its residential character, size, and selection policies – as well as the type and nature of the course and discipline area. In the USA this research has resulted in a variety of institutional strategies for selection, orientation, mentoring, academic and social transition assistance, early contact and community building, academic involvement and support, monitoring and early warning counselling and advising, and integration of programs.

Research on the academic performance of students generally and in various discipline areas and educational institutions, has generally increased in quantity and methodological complexity in recent years. This is particularly the case in the UK with the increase in schools' effectiveness research, which includes publication of league tables for schools and the recognition of the need for appropriate value-added multilevel statistical modelling, and also generally with the development of learning models based on economic production functions. A variety of Australian studies have been undertaken on transition and academic performance generally and by discipline area or student category and institutional type.

However, as the findings are not always consistent, research on student transition, performance and attrition needs to be analysed carefully to ascertain its validity in the current Australian context and to identify key factors.

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