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CASE STUDIES OF ABORIGINAL STUDENTS - A MEASURE OF SUCCESS FOR TERTIARY STUDIES

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INTRODUCTION

The issue of selecting potentially successful students for a course of study is of central concern to course organisers. Nowhere is this issue of more concern than in the area of bridging courses designed to promote access to tertiary courses and professions in which Aboriginal people are grossly under-represented. Organisers of bridging courses are faced with the problem of identifying potentially successful candidates and designing courses to meet their individual learning needs. The problem exists because of the unprecedented nature of innovative courses catering for newly defined clientele such as mature-aged, urban and academically aspiring Aboriginal students.

Bridging course organisers have an outstanding need for information about appropriate prerequisite student qualities and about methods of detecting them. Without this information, course organisers are at risk of using ad hoc selection processes and enrolling some students who are likely to be unsuccessful (yet again) but who might achieve success in a more appropriate course of study. This problem, which may be termed '*overselection*' of students, might be exacerbated by responsive course design which purports to meet the needs of individual students by providing individualised programs that allow students to progress "at their own best rates". In selecting candidates for this type of course there may be a temptation to relax selection criteria in an attempt to cater for any interested candidates regardless of educational background or personal circumstances.

On the other hand, there is a risk that potentially successful students might not be selected because they do not have certain prescribed qualities which they might later develop during the course of study. In remaining conscious of this latter problem, which may be termed '*underselection*' of students, course organisers

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might over-compensate in the selection process in favour of unsuitable candidates. Pressures to fill quotas (and receive maximum per capita grants) together with a 'bleeding heart' philosophy that justifies the selection of unsuitable candidates on the basis that they "will get something out of the course", also might be factors contributing to over-compensation in the selection process.

However, in the interests of course effectiveness which depends, in part, on the availability of (human and material) resources to individual students, and in the interests of the longer-term career prospects of all candidates, only those who are likely to be successful should be enrolled. The selection process, therefore, should be designed around a set of well-articulated criteria that have been determined in the light of years of experience and which have been substantiated by educational research. Unfortunately, the reality of the selection process for innovative bridging courses is the dearth of experience and research available to inform course organisers of appropriate selection criteria.

So, how to proceed? This paper describes an approach towards developing effective selection criteria based on the qualitative research methodology of case studies. Summaries of case studies of four Aboriginal students who recently enrolled in an innovative Aboriginal Bridging Course at Curtin University of Technology (formerly the Western Australian Institute of Technology) are presented. The attributes of the successful and unsuccessful students, together with the implications for course evaluation and the determination of selection criteria are discussed.

THE ABORIGINAL BRIDGING COURSE PROJECT

The Science and Mathematics Education Centre and the Centre for Aboriginal Studies of the Curtin University of Technology obtained a grant from the Commonwealth Tertiary Education Commission (CTEC), under its 1985 Equity Program, to develop 'bridging' programs for Aborigines who possessed inadequate secondary level education and who wished to qualify for entry into undergraduate science and technology courses.

The preliminary research findings (Malone, Taylor & Forrest, 1985) indicated that prospective Aboriginal students might be best served by a culturally supportive learning environment which fostered positive attitudes and self-concepts, promoted both peer group support and a positive image of Aboriginal cultures, and oriented students to the academic and social practices, expectations and values of the institution. The attitudes and activities

of the tutors and counsellors with whom the students had daily contact were assumed to be critical to the successful maintenance of a culturally supportive learning environment.

In addition, the project team was concerned to ensure that the curriculum design criteria were in accord with the learning needs of Aborigines as 'second chance' students. Typically, second chance students' previous learning experiences have been marked by low achievement in the subjects which they wish to study at the tertiary level.

From these considerations five major criteria were determined for designing the programs:

- a flexible time structure for self-paced learning;
- individualized instruction catering for individual students' daily learning needs and career aspirations;
- an assessment system that featured continuous diagnostic feedback and achievement testing;
- a learning management system that fostered student self-management of learning by means of: self-instruction, self-evaluation and self-organisation;
- successful achievement of short-term learning goals.

Programs in mathematics and chemistry were developed. The programs comprised a series of independent units of study which featured: pre-tests and achievement tests; personal study plans; review and study programs; and, where available, references to microcomputer-based software. Further details are available in the paper *Enhancing Access to Tertiary Science and Mathematics Among Aborigines* (Taylor, Fraser & Malone, 1986).

A pilot study of the chemistry and mathematics programs was conducted during the 1986 academic year. Four Aborigines (Steven, Gary, Frank and Bob - pseudonyms are used to protect the interests of the students) enrolled and attended 'classes' in the Science and Mathematics Education Centre for a total of 14 hours per week. The students also attended 'support' subjects at the Centre for Aboriginal Studies for a total of eight hours per week. The Centre for Aboriginal Studies provided support in the form of counsellors, a withdrawal space, and support subjects such as Aboriginal Studies, Study Skills and Communications Skills. The pilot study served two purposes: it provided the four students with a full-time bridging course; and enabled the course designers to evaluate and modify the program materials.

Because of the size of the student sample it was decided to adopt a case study approach to the evaluation. It was felt that case studies would provide a rich source of detailed information on the characteristics of the small sample of students, and would help to determine factors associated with successful and unsuccessful academic performance.

Pencil and paper tests and survey instruments were used to obtain information on students' abilities, attitudes and perceptions of the learning environment. Qualitative information was obtained from both students and tutors on: students' backgrounds; perceived effectiveness of program materials; and students' personal circumstances. Details of the evaluation are available in the paper, *Evaluation of Aboriginal Bridging Programs in Mathematics and Chemistry* (Malone, Treagust & Taylor, 1987).

THE CASE STUDIES IN SUMMARY

A summary of the case studies of the four students follows.

Steven

Steven was born in Darwin, Northern Territory in 1965 and spent most of his early life in Broome with his parents. He was sent to Perth for his secondary education and was a student in a metropolitan senior high school. Steven left school mid-way through Year 11 in 1982. At the time he was studying Mathematics 1, Physical Science, Biology, Applied Technology and Economics (subjects from the Tertiary Admissions Examination, or TAE syllabus). Although he enjoyed science and found it very interesting, he strongly disliked school and had an intense desire to leave as soon as possible. His academic motivation was not strong, and he found that his main interest at school was sport. He played cricket, football and basketball and still plays competitive basketball today.

After leaving school Steven worked in his uncle's landscape gardening business for two years. He then became employed by the Aboriginal Medical Service (AMS) as a laboratory assistant. His mother had been employed by AMS as a clinical sister for 10 years. Steven's interests in a professional career in medical science began to flourish. At work he was undergoing training in a pathology laboratory and away from work he sought out private tuition in Human Biology and Biochemistry, with a view to eventually sitting the university entrance examinations.

At the end of 1985, at the age of 20 years, he enrolled in the Aboriginal Bridging Course in the recently developed chemistry and mathematics programs. His expressed goal was 'to study medicine' and he saw the bridging program 'as a foundation to the higher medical sciences'. In particular, he wished to qualify for entry into the Medical Technology Course.

Steven successfully completed the 12 units of the Chemistry program and 7 units of the Mathematics program. His progress was commendable, especially in view of his generally weak mathematical background and his long absence from formal learning. His progress was assisted by his confidence as a learner, his high degree of self-motivation, and the impressive effort that he sustained throughout the year in meeting both his own goals and those of the programs.

As a learner, Steven was quietly confident and somewhat reserved, although he was usually willing to seek assistance from tutors and participated in group discussion. He developed efficient and effective organizational skills and was highly self-motivated. Although his degree of perseverance in overcoming learning difficulties was high, some of his misconceptions were not readily resolved in student-tutor interactions as his degree of resistance to their rejection was also high. However, after prolonged individual interactions with the tutors, Steven's misconceptions were eventually rectified.

Steven graduated, with distinction, from the Aboriginal Bridging Course, in December 1986. He applied for 'special-entry' into the Medical Science undergraduate course at an Australian university. Of five Aboriginal applicants from Western Australia, Steven was ranked second after preliminary interviews and was invited to attend a week-long testing and orientation program at the university. Ten Aborigines from Queensland, Victoria, South Australia and Western Australia competed for the four available 'special-entry' places. Steven was successful and was offered a place. He commenced in the first-year of the course in 1987. He was also offered a place in the Medical Laboratory Sciences undergraduate course at Curtin University of Technology. Steven successfully completed the first year of the course and is now in the second year.

Gary

Gary was born in Leonora, Western Australia, where he spent most of his early life with his parents. He was sent to Perth for his secondary education and was a resident student at a private

boys' secondary school. Gary completed Year 12 in 1985 and sat the Tertiary Admissions Examination in the following subjects: Maths 1, Geography, English, Physics, Biology, Advanced Industrial Arts. Gary's attitude to school and formal learning was not favourable during his final year. Although he had a high regard for his ability to achieve, he lacked confidence in contacts with his peers. He was appointed as a prefect at school but found fellow students 'difficult to handle', especially when they queried his racial background. He did not relate well to his mathematics teacher and did not receive the instructional support that he felt he needed. Even so, he retained a favourable attitude towards the subject. His favourite subject was science, especially chemistry which he 'dropped', however, in favour of physics, in order to meet the prerequisites for a flying career in the RAAF. His 'great love' was flying. Most weekends were spent playing sport and undergoing training for his private pilot's licence. Gary's academic motivation was, however, not very strong and his TAE results, especially in physics, precluded him from entry into the RAAF for pilot training.

At the end of Year 12, at the age of 18, he enrolled in the Aboriginal Bridging Course in the recently developed chemistry and mathematics programs. He also enrolled at a nearby college of Technical and Further Education in TAE Physics at the Year 12 level. His expressed goals included 'to achieve a better standard of preparation for the commercial flying course at Midland Technical College' and 'to attain a satisfactory entrance to any tertiary institution at a later date if, for some unknown reasons, I have to give up flying.' His main ambition, however, was to be a pilot.

Gary successfully completed 6 units of the Chemistry program and 7 units of the Mathematics program. However, his moderate degrees of self-motivation and overall effort prevented him from making further progress. He regarded physics as his highest priority subject and tended to procrastinate in achieving other program goals. As a learner, Gary was very confident in his own abilities and was able to quite readily overcome misconceptions under tutorial guidance. He exhibited a moderate-to-high degree of perseverance in overcoming learning difficulties and was willing to seek help from tutors and to join in group discussion. His confidence as a learner tended to be somewhat in advance of his competencies as a learner.

Gary was assessed as having fulfilled both his personal goals and the goals of the Chemistry and Mathematics programs. He graduated from the Aboriginal Bridging Course, in December 1986. Gary was

one of four Aborigines to be granted a national flying scholarship in 1987. He enrolled in a college of TAFE and is currently studying for a commercial pilot's licence.

Frank

Frank was born in Wyndham, Western Australia, in 1963 and lived in Darwin until his family moved to Perth when he was five years old. He was a student at a metropolitan senior high school and successfully completed Year 10 in 1978. He studied an 'alternative course' at Year 11 (1979) in the subjects: science, maths, cooking, home management, personal development and trade skills. He had an unfavourable attitude towards school and school learning and had a strong desire to leave school during his final year. He had an intense dislike of science, which he found very difficult to learn, but enjoyed mathematics for which he expressed a definite preference. His favourite subjects at school were cooking and sport. When talking about his enjoyment of his favourite school subjects he would often cite anecdotes relating to his liking of the teachers of those subjects. Likewise, his dislike of science and school was expressed in anecdotes about his science teacher and other teachers responsible for maintaining school discipline. Frank's academic motivation was generally indifferent and was characterized by a lack of effort and concentration during his final school year.

Frank enrolled in a pre-apprenticeship course at a college of Technical and Further Education in 1980 to train as an 'auto mechanic'. He claims to have failed the course and to have remained unemployed until August 1981, when he secured a job with the WA Fire Brigade as an apprentice auto mechanic. Although he enjoyed the work he became dissatisfied with the job as a result of conflicts with his boss over his performance. In December that year Frank left the job and recommenced a long period of unemployment that lasted until he enrolled in the Aboriginal Bridging Course in February 1986. During these four years Frank continued to live at home with his parents. His major interests were roller skating, roller hockey and judo. He was a club member in each of these sports, playing in competitions and coaching children. He would often talk about these interests with enthusiasm and at great length. He missed the first orientation week of the Aboriginal Bridging Course because of his involvement in a national roller hockey competition. During this time Frank damaged one of his hands, which was subsequently encased in plaster up to the elbow by a doctor. Frank claims to have had a disagreement with his coach over his withdrawal from the team and to have punched a wall in frustration.

His personal goals, which he hoped to have fulfilled by the course, were: 'to upgrade my education and improve my chances of getting a job in the field I choose'. Frank enrolled in the Mathematics program only. He was adamant that he did not want to study Chemistry because of his dislike of science when at school.

Frank needed extensive revision of mathematical concepts usually taught in Years 8 to 10. He also needed to develop learning skills in order to function effectively as a mathematics student. Consequently, he was placed on a revision program comprising written work which was referenced to an instructional text, and was supplemented by computer-based 'drill and practice' activities. The revision program was designed to meet Frank's individual learning needs and was matched to his own rate of learning. Frank attended supervised classes and received tutorial assistance 'on demand'.

Frank applied himself with great enthusiasm in the initial weeks and seemed to greatly enjoy the computer-based activities. He displayed a quick 'uptake' of concepts but had difficulty sustaining them, especially when new to him. He was very dependent on a highly structured learning environment and found it difficult to organise his time, to interpret instructional material from a text, to progress independently with text-based exercises, and to continue studying out of class and in class when the tutor was not present. By contrast, he would spend hours working on 'PLATO' educational programs on a microcomputer. During these activities he demonstrated mental alertness, enthusiasm, and an impressive cognitive functioning in terms of both speed and comprehension. The major limitation to these activities was the availability of suitable software.

Frank's enthusiasm for mathematics was not matched by his enthusiasm for the other support subjects. His desire was to study only mathematics and nothing else. However, he needed to develop his literacy skills and Aboriginal Studies was a compulsory subject. Frank began to absent himself from these other subjects, to complain about the teachers and their negative attitudes towards him (his perception) and about his inability to understand or to complete the work that was set for him.

At the same time Frank began to complain about a range of physical ailments: insomnia, tiredness, sore eyes, headaches, hearing problems, skin irritations, flu/colds. His attendance became erratic as his 'illnesses' came and went, as transport

problems arose (he had an accident with his car), and as family 'reunion' activities and other family-related responsibilities (e.g. taking his mother shopping) became higher priorities.

Frank perceived that he was unable to 'keep up' with his fellow students in mathematics, his favourite subject. This competitiveness was of his own creation, as the individualised nature of the syllabus model ensured that students could progress at their own 'best' rates of learning, independent of the other students. Frank did not appear, however, to accept this attribute of the program. Nor did he appear to be comfortable with the goal of learning to become an independent learner, although his organizational skills in relation to his written work did improve. He remained very dependent on the tutor for instruction and for motivation to work. His commitment to study extended only to the time he spent in supervised classes. 'Free-time' in his timetable was spent socialising with fellow students, or in the fitness club. His social interactions with fellow Aboriginal students seemed to be causing him problems. Feedback from his fellow students indicated that he was behaving in a largely inept way and had become somewhat of a target of group disdain. Retreat into his favourite subject was becoming less available as pressure from the tutor was mounting for him to improve his performance (he had not attempted his first mastery test by August, 1986).

Frank announced, in August, that his goals for 1987 were not being served by his continuing as a student on the Aboriginal Bridging Course. He wanted to drive around Australia with a friend and therefore immediately needed to improve his financial position and prospects for employment. He would be able to do the former by returning to the dole (\$20 extra per fortnight). He wanted to undertake a course on 'bar-tendering', run by the Commonwealth Employment Service, so that he would be able to obtain paid employment and proceed with his new plans. Frank successfully completed the six-week Commonwealth Employment Service course on hotel bar management.

Bob

Bob was born in Geraldton, Western Australia, in 1957 and spent most of his life in the area. He attended a local senior high school and completed Year 10 in 1972. After leaving school Bob worked as an unskilled manual labourer for a variety of employers in jobs such as: a freezer hand in a meat works, a fettler on the railways, a labourer in a cement works, and for a rural fencing contractor. In 1979 he enrolled in a local technical

college in a 'refresher course' where he studied Mathematics, English, Woodwork, Automotive, Metal Work, Cooking. However, he 'pulled out after three months because of family reasons'.

Bob's memory of his last year at school (1972) was that school was enjoyable, to some extent, but that he had a desire to leave as soon possible. Mathematics was one of his favourite subjects, which he found interesting and enjoyable. He also enjoyed and valued science but found it to be a difficult subject to learn. Bob's academic motivation was not strong and although he derived some satisfaction from learning, he was not prepared to put much effort into his school work.

By the end of 1985 Bob, at age 28 years, was married but separated from his wife and young children. They remained in Geraldton while he and his young brother moved to Perth to enrol in the Aboriginal Bridging Course (his explanation). They initially shared accommodation at their cousin's home. Bob, his brother and his cousin subsequently enrolled in the Course. Bob wanted the Course to enable him 'to broaden my knowledge within myself and to prove to myself that I can achieve things if I put my mind to it, and it will also give me a better opportunity to seek better employment that I never had before'. However, he wanted to study only the mathematics program because of the difficulties he had experienced at school in learning science.

His progress in the mathematics program was slow, as he had to be placed on a revision program comprising work normally learnt in Years 8 to 10. Although he was strongly self-motivated to learn, his poor study skills, undeveloped problem-solving ability, and unconsolidated basic concepts made the task of his achieving the status of a competent Year 11 mathematics student very remote. Bob did improve his organisational and self-instructional abilities and was beginning to seek assistance from the tutor, although he preferred to work independently. He responded very well to the computer-based 'drill and practice' activities, improving his performance in a number of areas.

Out of class, Bob was unable to complete the study programs as he often required tutorial assistance. His accommodation was also unsuitable for home-based study and he had problems with the safe keeping of his files. They were often interfered with by his cousin's children. He remained enrolled in the Course for only 8 weeks. During this time his attendance was disrupted by family problems which required him to return to Geraldton on three occasions. He had to attend two funerals and, finally, the

sickness of one of his children. Bob passed a message to the Course organiser through his cousin to the effect that he wanted to return to complete the Course at some future time but that he did not want to leave his family at present.

ATTRIBUTES OF SUCCESSFUL AND UNSUCCESSFUL STUDENTS

1. EDUCATIONAL BACKGROUND

Both Steven and Gary had previously studied mathematics and a physical science subject to, at least, Year 11 level. The 'bridgeable gap' in their knowledge was, therefore, of a manageable size. They had also developed the basis of effective study skills which were further developed and refined during the Course.

By contrast, Bob had completed only Year 10 at high school, while Frank had completed an 'alternative course' at Year 11 level which had included a 'practical' mathematics subject. The 'bridgeable gap' in their mathematical knowledge proved to be vast and there seemed little likelihood of successful progress much beyond a revision program for at least the first six months of their enrolments in the Course.

Their study skills were inadequate, although Frank showed some improvement in file organisation and setting out of solutions to exercises.

2. CAREER GOALS

Gary and Steven had clearly defined personal career goals from the outset of the Course. These goals were directly related to their chosen Bridging Course subjects. Even though Gary's personal goals changed during the year he sustained a clear mental image of his preferred career.

Neither Bob nor Frank had formulated a clear career goal toward which the Course could have taken them. Their personal goals remained imprecise and were expressed in terms of general personal improvement. Frank was provided with professional careers guidance at Curtin but did not seem to be interested in planning for his future. He seemed to perceive the Course as an end in its own right, rather than as a means to an end. When he finally expressed a personal goal, it seemed to be in response to mounting pressure by the tutor for an improvement in his academic performance, and provided him with a 'self-justification' for leaving the Course.

3. FAMILY SUPPORT

Gary, Steven and Frank enjoyed strong and sustained family support, especially from their (Aboriginal) mothers. Both Gary's and Steven's mothers were trained professionals with senior responsibilities in their fields.

Bob enrolled in the Aboriginal Bridging Course together with his brother and cousin (they did not study the mathematics and science programs). Initially they seemed to provide Bob with the necessary moral support to be separated from his wife and children. However, Bob's sense of family commitment competed with his priority to complete the Course, and he eventually terminated his enrolment and returned to live with his wife and child in a rural town.

4. FINANCIAL SECURITY

Both Gary and Steven were able to supplement their Aboriginal Study Grants. Gary's parents provided financial support to enable him to have flying lessons and his own car. Steven continued to work in his uncle's landscape gardening business on weekends and holidays to enable him to maintain his own car. Neither of them had to support wives or children, and neither had transport difficulties in attending campus daily.

Bob wanted to find accommodation in Perth so that his family could live with him. He found, however, that this type of accommodation was beyond his financial capacity. Frank complained that he would 'be \$20 a fortnight better off on the dole' and continually borrowed money from his parents. This became a major concern to him when he damaged his car in an accident and needed to repair it. However, Frank did not appear to be able to manage his personal budget and was always running out of money. He exhibited a 'spend now and worry about it later' attitude.

5. SELF MOTIVATION TO STUDY

Both Steven and Gary were self-motivated to study from the outset of the Course, and they sustained their self-motivation for the duration of the Course. Steven, who was the more academically oriented with his career goals, sustained a higher level of self-motivation.

Both Bob and Frank, initially, were strongly motivated to study. Bob seemed unable to complete any work at home, however, because of unfavourable accommodation, and Frank was unable to do

so because of conceptual difficulties and weak study skills. Frank's 'in-class' performance eventually suffered from a weakening of his self-motivation to study, and was supplemented by a socialisation process which had to be controlled by the tutor. There were times, however, when his progress would forge ahead as a result of an uncharacteristic effort to complete a study program.

6. RESPECT AND CONFIDENTCE IN SELF

Stephen and Gary each had a positive self-regard for their abilities to achieve their personal goals, although they both lacked confidence in their relationships with their non-Aboriginal peers. Their self-regard as learners, which increased during the Course, together with their self-motivation to study, appeared to enable them to overcome their 'shyness' and to effectively engage their tutors in discussions about course work, Aboriginal issues, and (for Gary) family life. Participation in tutor-led group discussion about aspects of course work formed a small but important part of the learning activities. Students' misconceptions were more readily detected and diagnosed as a result of this active participation.

Frank and Bob both lacked confidence in their abilities to achieve their personal goals. Both students seemed to be sociable with their peers but Frank lacked social skills. As Frank's progress in the Course did not keep pace with his fellow students his self-esteem as a learner seemed to weaken along with his self-motivation to study. Frank felt sufficiently relaxed to talk at length about his family life and friends, providing endless humorous anecdotes. With time, this need to socialise became dominant and potentially disruptive of the learning environment. It provided him with an alternative, self-perceived successful role in the classroom.

7. SELF-EVALUATION

Steven and Gary developed the ability to evaluate their understanding of a new concept to the extent that they could realize their need for tutorial assistance and question the validity of that assistance. This is a hallmark of an independent learner who is interested in full comprehension of a concept rather than only in memorisation of algorithms that form part of a concept.

Neither Bob nor Frank progressed very far with the development of learning skills. Bob's enrolment in the Course was too brief, and Frank seemed content with memorisation of rules and

algorithms, rather than seeking to fully understand the concepts he was encountering. He frequently 'got stuck' with the exercises (i.e. routine problems) but seemed unable to employ the problem-solving strategies that the tutor continually outlined. At best, he sought tutorial assistance when he needed it, but was only interested in obtaining the correct answer, rather than focusing on the problem-solving processes and the accompanying strategies. He lacked a rigorous and enquiring attitude and failed to perceive his learning activities in an objective manner.

PREDICTING SUCCESSFUL ACADEMIC PERFORMANCE

A clear distinction between the successful and unsuccessful students emerged from a consideration of the case studies. This distinction has been described above in terms of seven attributes present or absent in each student. The question now arises as to the predictive validity of each of these attributes for determining successful academic performance. In other words, can we use these attributes as selection criteria in order to select those candidates likely to succeed in a bridging course, and to reject those likely to fail and thereby avoid the problems of 'overselection' and 'underselection'.

Unfortunately, the short answer is "no", or at least, "not yet". Let us firstly consider some of the reasons for not being able to use the seven attributes as selection criteria, and then consider what is required in order that, eventually, we may be able to do so.

Firstly, we have not established a 'cause and effect' relationship between the attributes and academic performance. It is not true to say, for example, that well-defined career goals or strong self-motivation to study or high self-regard are qualities that automatically lead to successful academic performance, or that their absence automatically leads to failure. Further, we have not established whether strength in one attribute, or in several attributes, makes up for weakness in another. For example, a student with well-defined career goals and financial security but whose educational background seems inadequate might well succeed. Whereas a student with strong self-motivation to study and family support but who lacks adequate financial security might fail.

Secondly, it is not good practice to generalise from the findings concerning a small sample (in this case 4 students) to a

large population. The attributes of success/failure determined in this study might prove to be idiosyncratic. In other words, the students in this study might not be typical of prospective students applying for bridging courses elsewhere. Further, the nature of Aboriginal bridging courses is not consistent. There are a variety of subjects (in this case science and mathematics), purposes and organisational aspects associated with bridging courses. So, attributes of success or failure relevant to one bridging course might not be relevant to another.

Thirdly, some attributes associated with successful performance might develop during the course as a result of individual student development. Rather than serve as a selection criterion, a particular attribute might become a course design criterion. In other words, students might be assisted to develop certain attributes of successful performance by a conscious effort on the part of teaching and support staff. For example, student development of self-evaluation skills and positive respect and confidence in self could become course objectives.

Fourthly, there might have been other factors operating that influenced student performance and which remained unidentified in this study but which might serve as reliable predictors of student performance.

So what can be done with the findings of this study in order to more accurately forecast, and facilitate, successful Aboriginal student performance? Clearly, these findings cannot stand alone. They must be supported (or refuted) by findings from other similar studies. In the longer-term these findings should be incorporated into a *national information bank on Aboriginal pedagogy* that will provide guidelines on the learning characteristics and needs of a range of identifiable groups of Aboriginal students. Organisers of future courses for Aborigines will benefit from being able to access the information bank on aspects of Aboriginal learning directly relevant to their specific client group.

In the shorter term, course organisers should remain conscious of their responsibility for actively contributing to the *development* of the information bank. It is their task to systematically obtain, record and publish information on the attributes of their successful and unsuccessful students. Once sufficient information has been produced and placed in the public domain further studies can be designed to substantiate the nature and strength of the relationships between identified student attributes and academic performance, and to determine their applicability to identifiable groups of prospective Aboriginal students.

The systematic generation of information for a national information bank on Aboriginal pedagogy can be readily undertaken as a joint venture between teaching staff and course organisers. A beneficial side-effect of this activity is the evaluation of the effectiveness of the course design and its implementation in the teaching program. By placing the case study activity on the open agenda students can be encouraged to actively contribute their perspectives on their specific learning needs and on the effectiveness of the course in meeting them. In this way the course "provider-perspective" can be compared with the students' "user-perspective" and discrepancies between them identified. This can lead to the identification of factors influencing student academic performance.

With sufficient information available on the attributes of successful students it will be possible for course organisers to ensure that their courses are well matched to the learning needs of their students and that the selected students are well suited to course requirements. A national information bank on Aboriginal pedagogy can provide that information.

The need to successfully predict academic achievement in science is of concern to other groups within society who are often described as 'at risk' with regard to their continuation in science studies. For example, even after expressing an initial interest in science careers, women are less likely to continue in science. Indeed, males express more positive science and mathematics attitudes and greater interest in science course and careers in science (Steinkamp & Maehe, 1984). Research has shown that confidence in one's own science and mathematics abilities is positively correlated both to science and mathematics achievement and persistence in science for both boys and girls (Sherman, 1984). In brief, the attributes of successful and non-successful students described in the four case studies support research with other identifiable groups of learners.

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OVERSEAS STUDY



Letitia Murgha (Kennedy) one of the first three students to graduate from AITEP (Aboriginal and Islander Teacher Education Program, James Cook University, Townsville) has been awarded a three month overseas study bursary. Her study will be based at the Bi-lingual Education Program at Rock Point School in the American south-west. She will concentrate her research on the Navajo and Zuni Indians, focusing on the involvement and control they have and exercise within their own community.

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(Editor's Note: Dr Daniel McLaughlin, the English Language Elementary Principal at Rock Point Community School is the new editor of the *Journal of Navajo Education*. He takes over from Dr Walter Robertson who, on his sabbatical in Australia some six years ago read copies of *The Aboriginal Child at School* and decided to commence a similar type of publication for teachers of Navajo students. Current subscription rate for the *Journal of Navajo Education* is US\$10 and the address - P O Box 159, Rock Point, Arizona USA 86545.)