Adults returning to study VCE Mathematics:

lifelong learning, transition and engagement, and the adult learner

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This document contains the abstract, introduction, and conclusion for my Master of Education thesis. The full copy of the thesis is available online at the Monash University digital repository.

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Declaration: This thesis contains no material that has been accepted for the award of any other degree or diploma in any educational institution and, to the best of my knowledge and belief, it contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

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Ethics Approval: The research for this thesis received the approval of the Monash University Standing Committee for Ethical Research on Humans

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Credits

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Abstract

This study investigates the experiences of adults returning to study mathematics in an adult learning environment. Current government policy aims to increase school retention rates, and the proportion of low socio-economic status school leavers who successfully make the transition to higher education (Skills Victoria, 2010a). The Technical and Further Education (TAFE) system in Australia has a long history of providing adults who experienced school as problematic, with a 'second chance' to complete their general education in a post-school setting. This study seeks to improve understanding of how these policy goals might be achieved, and to contribute to pedagogical debates on how we meet the needs of learners who have experienced social, economic and educational barriers (Kell, 2010).

The study explores the factors that influence persistence and non-persistence of second chance learners who chose to study a Year 12 Mathematics subject at the Victorian Certificate of Education level (VCE) at a suburban TAFE Institute. The primary motivation of adults who enroll in a senior secondary certificate at TAFE "is to obtain a university entrance score as a prerequisite for university" (Karmel, 2004, p. 3). Year 12 Mathematics presents a significant hurdle for students who may have had a disrupted education, yet is needed for progression into many study and career paths.

This study used qualitative semi-structured interviews to gather insight into educational experiences of the three participants who were all enrolled in Year 12Mathematical Methods. Two students were early school leavers; the third was a school completer returning to study to pursue an alternate career path after ten years in the workforce.

The study highlights how the interaction of affective, cognitive and conative factors can influence a student's successful reengagement with a 'hard' Year 12 Mathematics subject. Each of the participants reported a positive attitude towards mathematics as a discipline. However, there were significant differences in work habits (Corno, 2004) and approaches to learning, of the students who did or did not persist in the subject. The data analysis suggests that one's self-theory of intelligence may be influence one's ability to study effectively (see Dweck, 1999). Experiential learning in the work place, and through extra-curricula activities, may also assist some older students to develop an incremental mindset and a strategic approach to learning.

The outcomes of this study, while small scale, are important for a few reasons. The study contributes to the under-researched field of adults returning to study mathematics at senior secondary level. Students with a clear sense of agency, who have developed a strategic approach to learning, are able to overcome significant deficits of prior knowledge and successfully complete an academic year 12subject. Teachers in both secondary school and TAFE need to make the link between effort and learning explicit for students at all levels. The study also has implications for the recent punitive education policies of the Australian State and Commonwealth governments. Time is a critical factor in the development of an incremental mindset, and the associated sense of agency, needed to enable second chance learners to successfully reengage with school mathematics. For some adults this process may take years.

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Glossary

Acronym	Definition
ABS	Australian Bureau of Statistics
ACE	Adult and Community Education
ACER	Australian Council for Educational Research
ACOTAFE	Australian Committee on Technical and Further Education
AEI	Australian Education International
ALM	Adults Learning Mathematics
ANTA	Australian National Training Authority
AQF	Australian Qualifications Framework
CAE	Centre for Adult Education
CGEA	Certificates in General Education for Adults
DEECD	Department of Education and Early Childhood Development (Victorian Government)
DEEWR	Department of Education, Employment and Workplace Relations (Australian Government) – formerly DEST
DEST	Department of Education, Science and Training
ENTER	Equivalent National Tertiary Entrance Rank
LLEN	Local Learning and Employment Network
NCVER	National Centre for Vocational Education Research
OMHS	Outer Melbourne High School (pseudonym)
OMIT	Outer Melbourne Institute of TAFE (pseudonym)
PISA	Programme for International Student Assessment
RTO	Registered Training Organisation
SAC	School Assessed Coursework
SSCE	Senior Secondary Certificate of Education
TAFE	Technical and Further Education
TIMSS	Trends in International Mathematics and Science Study
VASS	Victorian Assessment Software System
VCAA	Victorian Curriculum and Assessment Authority
VCAB	Victorian Curriculum and Assessment Board
VCAL	Victorian Certificate of Applied Learning
VCE	Victorian Certificate of Education
VET	Vocational Education and Training

VLESC	Victorian Learning and Employment Skills Commission
VTAC	Victorian Tertiary Admissions Centre

Introduction

Like most practitioner-researchers this study was influenced by my interest in solving a practical issue in my workplace (Dirkx, 2006). I teach adults and early school leavers who want to complete the Victorian Certificate of Education (VCE) in an adult learning environment. Within the VCE program teachers continually strive to improve the retention, participation and learning of a diverse cohort of students. I am particularly interested in enabling these students to successfully complete Year 12 mathematics.

Each year students choose to study a VCE mathematics subject as a prerequisite for entry into a wide variety of tertiary courses and careers. Unlike in secondary schools, adult students cannot be compelled to attend class and some students may drop out during the course. Hence, attrition has been a problem for the Technical and Further Education (TAFE) sector since its inception (eg. Brougham, 1978). This is a particular issue for early school leavers as any unsuccessful attempt to return to study may reinforce "earlier feelings of inadequacy and failure" (McGivney, 2003, p. 13).

An underlying assumption of this study is that teaching VCE Mathematics in TAFE is "likely to be more effective when teachers understand who their students are, their backgrounds, the contexts they bring with them, and their reasons and purposes" for returning to study (Swain, 2005, pp. 317-318). Therefore the aim of this study is to develop a clearer understanding of the affective, cognitive and conative factors that influence persistence and non-persistence of adults undertaking a Year 12 Mathematics subject in a Further Education setting.

1.1 Rationale

In their report on the effective delivery of courses to young people, 15-24 years old, Volkoff, Keating, Walstab, and Marr (2006) concluded that

> Young people who are engaged in studying senior secondary certificates in TAFE and ACE, that is, early school leavers, are likely to require quite intensive learning support, career and pathway planning assistance and personal support, particularly when compared to the support needs of young people engaged in mainstream VET programs while still at school or following completion of Year 12 (pp. 3-4).

Volkoff et al. (2006, p. 4) asserted that while TAFE teachers cannot be expected to "work with these young people on an ongoing basis" there is a need for professional

development activities which builds expertise in supporting young people at risk of disengaging with education. These activities include developing an understanding of "the learning needs and preferences of young people" and "the varied disadvantaging circumstances encountered by young people" (p. 4). Despite the delivery of modules using adult learning principles young people continue to withdraw from VCE classes, especially Science and Mathematics subjects. However, the main participants consulted were staff of key organisations associated with the Vocational Education and Training (VET) sector (pp. 10-12). If we are to support all students who are 'at risk' then we need to give a voice to those students who do not make a successful transition to reengage with education in the adult learning environment.

1.2 The Research Context

TAFE Institutes are primarily responsible for the delivery of certificate and diploma programs for the VET sector (Australian Education International [AEI], 2008, p. 31). Thus, the learning culture of the typical TAFE program is focused on delivering specific vocational training for motivated and engaged adults.

However, TAFE, and its predecessors, also has a long history of providing general education courses to meet the learning needs of students who experience disadvantage due to the deficiencies in the education system. The following sections will provide an overview of the historical context for both the evolution of the VET and the Schools sectors, with a particular focus on Victoria.

1.2.1 An overview of Further Education in Victoria

As in other states, the development of the TAFE in Victoria has "been both ad hoc and independent in manner" (Van Der Linde, 2006, p. 38). The genesis of the contemporary VET sector is widely attributed to the establishment of Mechanics Institutes in most Australian colonies during the early nineteenth century (see, for example: Department of Education Employment and Workplace Relations [DEEWR], 2010b; Docherty, 1973; Van Der Linde, 2006). The Melbourne (Mechanics) Institute was established in 1839 at a time of little formal education when "vocations were learnt through on-the-job experience" (Docherty, 1973, p. 607).

Historical Overview of Education in Victoria (1838-1973)

For most of the early 1800s, education was voluntary and mostly provided for the middle class by non-government institutions, such as the Mechanics institutes (Docherty, 1973, p. 607). During the 1850s and 1860s a few night schools were established to provide some adults with the "opportunity to proceed to 'higher branches' of learning if possible" (Blake, 1973, p. 153). From 1869 the state government began to take a greater interest in providing a basic education for all citizens. From 1869 to 1890 the Technological Commission established sixteen independent technical institutions throughout Victoria to provide the Working Classes with instruction related to technological and industrial occupations (Docherty, 1973, pp. 608-610). The most common were the Schools of Mines which had their genesis in the need to train the personnel in charge of mining operations (p. 611). Despite the introduction of compulsory primary education in 1872, most Schools of Mines needed to provide State school classes as students often "came ill-prepared for science and trade courses" (p. 619).

Between 1872 and 1910 secondary education was, with a few exceptions, the exclusive domain of the denominational and private school sector. In 1898 the Working Men's College, a predecessor of RMIT, introduced a preparatory year to meet the scholarship demands of the "many students who were ill-prepared for the day diploma courses" (Docherty, 1973, p. 644). In 1910 the Victorian Government established the state controlled secular secondary education system. However, there was still a need for some Technical Colleges to provide a range of preparatory classes until they also became an "obligation of the high schools" in 1965 (p. 736).

Technical and Further Education (1973-2010)

In 1972 a new federal Labour government was elected with a strong social justice platform and it quickly established various education advisory commissions. The report of the Australian Committee on Technical and Further Education (ACOTAFE) (1974), commonly known as the Kangan report, "defined the roles and the mission of what is now known as the TAFE system" (DEEWR, 2010a).

In particular the social role of TAFE as a 'second chance' enabler was stressed: "Strong emphasis should be placed on unrestricted access to recurrent education … to enable adults to attempt [to make] good of omissions or deficiencies related to primary and

secondary schooling" (ACOTAFE & Kangan, 1974, pp. xxiii-xxix). However, by the late 1980s the success of policies aimed at improving retention of secondary school students through to Year 12 resulted in a reduced demand for TAFE preparatory courses (Connell, 1993, p. 347).

The 1990s was a "turning point in the development of the Australian VET system" (Knight & Mlotkowski, 2009, p. 37). A new national body, the Australian National Training Authority (ANTA), was established to oversee a nationally consistent VET system (Goozee, 2001, p. 85). During its tenure, 1992-2005, ANTA developed three major national training strategies which set the agenda for the ongoing development of TAFE and the VET sector in Australia: *Towards a Skilled Australia* (1994-1998); *A Bridge to the Future* (1998-2003); and *Shaping our Future* (2004-2010) (DEEWR, 2010c).

ANTA's first two national strategies implemented a shift in education policy towards an economic paradigm focused on developing human capital to enhance the economic development of Australia (G. N. McMillan, 2007, p. 181). Resulted in a gradual reduction in the "quality and comprehensiveness" of the provision of services for young adults at risk of being unable to secure full time employment (McIntyre, Freeland, Melville, & Schwenke, 1999, p. 82). Despite this some TAFEs continued to support programs which provided early school leavers with a second chance at completing their schooling (see, for example McIntyre, et al., 1999).

During the early 2000s there was a growing consensus that the economic utility emphasis of these national strategies was flawed as the needs of some equity groups were not being addressed (Australian Education Union [AEU], 2001; Bowman, 2004; Marginson, 2002). Many of these concerns were addressed in *Shaping our Future*, a new national strategy which established a more equitable balance between the economic and social agendas for the VET sector, and TAFE in particular (G. N. McMillan, 2007).

In 2005, the Victorian Government proposed to address the skills shortage, a national priority, by focusing "on increasing pathways and engagement of early school leavers and those at risk of leaving school early" (Victorian State Government, 2005, p. 3). One result of this policy was that Victorian TAFEs were 'encouraged' to support any post-compulsory student (over 15 years old) who wished to "complete Year 12 or an

equivalent training qualification" (Skills Victoria, 2006, p. 26). This led to a dramatic change in the range of ages, educational and socio-economic backgrounds of the students returning to study the VCE at TAFE.

1.2.2 The Victorian Certificate of Education

The VCE is a senior secondary school certificate which is "designed to be completed by school students" (Victorian Curriculum and Assessment Authority [VCAA], 2007a, p. 2). The VCE prepares candidates to enter university, TAFE institutes, the workplace, and for other life roles (Australian Qualifications Framework Advisory Board, 2007). From 1991, the VCE replaced all previous Year 12 courses, such as the Higher School Certificate (HSC) and the TAFE Tertiary Orientation Program (TOP).

During the 1980s retention to Year 12 had increased significantly. This was probably due to the decline in full-time employment opportunities for youth and a range of Commonwealth government policies aimed at addressing this issue (Burke & Spaull, 2001). By the mid-1980s a significant proportion of the student population gained access to higher education via the TAFE Tertiary Orientation Program. The designers of the VCE sought to rationalise the variations in curriculum and assessment between the different Year 12 courses. The intention was to provide all students with a pathway to further education through a culturally sensitive school based curriculum. However, what was implemented was a "standardised, externally-examined and moderated curriculum" which favoured elite schools and "left the educationally disadvantaged worse off than before" (Marginson, 2002, pp. 9-10). Since the introduction of the VCE a number of alternate programs and strategies have been implemented in an effort to improve Year 12 retention and equity outcomes. For example, the Victorian Certificate of Applied Learning (VCAL) (Pritchard & Anderson, 2009) and VET in Schools (McDonald, 2010).

In 2001, Victorian TAFEs piloted programs for including school aged students in the 'adult' VCE program and within two years 3,763 young adults were doing the VCE at TAFE (Long, 2005, p. 7). Thus, students who study the VCE at TAFE now have a wide variety of educational backgrounds and goals. These students are sometimes referred to as 'second chance' learners (Ross & Gray, 2005, p. 113) and include:

1. Adult Students – students who are over 18 years old and who have left fulltime secondary schooling (VCAA, 2007a, p. 8). Most of these students are now typically in their twenties.
2. Continuing students – any school age student, usually aged 16-19, who is not classified as an adult student by the VCAA (p. 184). Including students, under 18 years old, who have completed the TAFE Certificates in General Education for Adults (CGEA), a literacy and numeracy program for early school leavers who have not completed Year 10.
3. VCE completers – who are repeating subjects to improve their Equivalent National Tertiary Entrance Rank (ENTER) or studying additional subjects to meet university prerequisites.
4. International Students – there is an increasing number of full fee paying students undertaking the VCE.

1.2.3 Why VCE Mathematics?

Mathematics remains one of the access subjects to further education which can improve "young peoples' life chances" (Thomas, 2000, p. 1). Marginson (2002) asserts that, in terms of social disadvantage, exclusion from school through early school leaving is only part of the story:

> Even among those that remain at school, there are pronounced inequalities of scholastic achievement, between students from different suburbs and regions, between students from government schools and students from independent private schools, and fundamentally, between students from different SES backgrounds as measured by parental income and employment (p. 12).

One of the most pronounced area of inequalities is scholastic achievement in the 'hard' subjects, especially mathematics and the physical sciences. For example "students from independent private schools (boys 61% girls 48%) are much more likely than high school students (boys 37% girls 26%) to enrol in preparatory mathematics, much more likely to pass and much more likely to achieve honours grades" (p. 12). Also, while few Year 12 subjects have prerequisites it is recommended that students should successfully completed Year 11 mathematics before attempting the equivalent Year 12 subject (VCAA, 2005, p. 12). Adults returning to study a Year 12 Mathematics subject at TAFE may experience additional problems not experienced by continuing students. Such as

adjusting to a fully prescribed course with a demanding workload and balancing school, work and family commitments (Bennison, 1998)

Earlier studies on adults returning to TAFE to study Mathematics at the senior secondary certificate level have concentrated on how the teaching could change to suit the needs of mature adult students (for example Bennison, 2002; FitzSimons, 1994). These studies focused on the 'successful' students – the students who remained in the class for the duration of the study.

There has been little research focused on retention/attrition issues related to second chance learners, both youth and adult, returning to study senior secondary mathematics at TAFE (or other further education setting). The non-completion rate for students enrolled in a Senior Secondary Certificate of Education (SSCE), such as the VCE, in TAFE across Australia during 2000 was 34.8% (Shah & Burke, 2003, p. 10). However, in my experience the non-completion rate for VCE Mathematics students can be as high as 50%. If we are to truly improve young peoples' life chances then we need to look at the whole cohort, not just those who successfully make the transition from early school leaver to student, but also those who do not persist.

1.2.4 Outer Melbourne Institute of TAFE

This study was undertaken within a specific local context, the Outer Melbourne Institute of TAFE (OMIT). As an ongoing staff member at OMIT I have an extensive knowledge of the Institute's learning culture, processes and procedures. The objectives of this study fit well with the long term strategic direction outlined by the OMIT's board of directors. I have lived and worked within OMITs catchment since early childhood. Hence, I also have an intimate understanding of the social, cultural and historical context for the study.

OMIT is a large multi-campus TAFE situated on the outer suburban fringe of Melbourne. The VCE is currently taught on the two largest campuses. Each is situated near major retail hubs and well served by public transport. Most students live close to the campus they attend. However, some students may spend up to 2 hours travelling to and from the campus.

In the year of the study 146 students were enrolled in a Year 12 Mathematics class, 116 in Further Mathematics and 30 in Mathematical Methods. Each campus ran two Further Mathematics classes and one Mathematical Methods class.

1.3 The Research Question

The goal of this study is to develop a deeper understanding of the affective, cognitive and conative factors that influenced the learning trajectories of these second chance learners. In particular I wanted to give a voice to the students who were unable to make the transition back into the Mathematics class in the hope that I might identify a new strategic approach for helping these students realise their goals.

This study will explore how the factors commonly associated with non-completion in the higher education and secondary sectors operate at a personal level for students enrolled in VCE Mathematics at TAFE. In particular

1. What was the decision making process that led to the student's decision to return to study VCE Mathematics at TAFE?
2. What are the factors and triggers that lead some students to withdraw, while others persevere with VCE Mathematics?
3. What are the implications for policy makers, TAFE Managers, VCE Coordinators, and VCE Mathematics teachers at both secondary school and at TAFE?

1.4 How this Thesis is organised

Chapter two provides an outline of the literature relevant to this study. In particular it details how this study fits at the intersection of the attrition and adult learning mathematics research fields.

Chapter three is a methodological discussion of the actual course of my decision making as I adapted the study in response to issues emerging while implementing the research design.

Chapter four is an analysis of the Danielle's interview, a case study of the only participant who had dropped out of a Year 12 Mathematics class. Written immediately after the interview the analysis and discussion assumed that it was likely that no other students would opt in to the study. Therefore it was decided to use a variety of

approaches to explore the multiple interpretations of the interview data (Kvale & Brinkmann, 2009). In this chapter I also 'played' with different approaches for representing the interview data which enabled the participant's voice to be heard.

Chapter five is a case study analysis of the two participants, Ryu and David, who completed the Year 12 Mathematical Methods class. This chapter used the themes identified during the analysis of Danielle's interview to explore the different learning trajectories of these successful second chance learners.

Chapter six discusses the similarities and differences between the three cases and includes the key findings. Briefly, I suggest that the learning trajectories and attitudes of these three students confirms that the work of Lyn Corno (2004), on work habits, and Carol Dweck (1999), on student's self theories of intelligence, may provide strategies to improve the persistence of second chance learners who enrol in a Year 12 Mathematics subject.

Chapter seven concludes with a summary of the key findings, the limitations of the study, suggestions for the improvement of the provision learning support for second chance learners, and recommendations for future research arising from this study.

7 Conclusion

TAFE and its predecessors have a long history of providing the disenfranchised with a second chance to complete their secondary school education. Since 2001 there has been an increased blurring of the boundaries between the VET and secondary school sectors due to the implementation of range of policy initiatives to improve school completion rates to Year 12 or its equivalent. Most recently, in 2006, the Victorian government introduced the Youth Guarantee program "to support all young Victorians … aged less than 20 years, to complete Year 12 or an equivalent training qualification in a TAFE institute" (Skills Victoria, 2006, p. 26). This change meant that TAFE VCE teachers needed to adjust their pedagogy from one aimed at a predominantly adult cohort to one which catered for a more diverse range of ages, backgrounds, interests and attitudes towards learning.

Within the VCE one of the most pronounced areas of inequalities, in terms of scholastic achievement, between students from different socio-economic backgrounds is in the 'hard' subjects such as mathematics (Marginson, 2002). A review of the literature on adults learning mathematics identified that most studies which investigated the experiences of students in preparatory courses (numeracy, senior secondary, tertiary preparation and bridging courses) focused on the students who persisted in the mathematics class. However, several of these studies identified that the dropout rate for these courses was as high as 50% (for example, Bennison, 2002; Carmichael & Taylor, 2005).

The aim of this study was to develop a clearer understanding of the factors that influence persistence and non-persistence of adults undertaking a Year 12 Mathematics subject in a Further Education setting. An underlying assumption of this study was that teaching VCE Mathematics in TAFE was "likely to be more effective when teachers understand who their students are, their backgrounds, the contexts they bring with them, and their reasons and purposes" for returning to study (Swain, 2005, pp. 317-318).

Before discussing the main findings of the study I will briefly outline and discuss some of the key issues associated with the methodology used in this study.

7.1 Reflections on the Methodology

The methodological approach was influenced by the need to balance the practical realities of undertaking research in the Victorian TAFE sector, the ethical considerations of doing insider research, and the desire to pay attention to the voice of these non-mainstream participants.

Previous studies of preparatory students doing mathematics (for example, Bennison, 2002; Hodges, 2005) highlighted the need for a methodological approach which was both flexible and could cope with low participation rates. The diversity in the backgrounds of the small number of students who undertake VCE Mathematics at TAFE was also a factor. The decision to use semi-structured interviews has been rewarded by the diversity in the learning trajectories of the three participants.

The decision to focus on one research site, OMIT, was influenced by my perception of the likelihood of cooperation from other RTOs in Melbourne. The TAFE sector in Victoria is unusual in that many of its early institutes have "survived as autonomous institutions" (Goozee, 2001, p. 13). While each TAFE attracts most students from the adjacent suburbs they are not limited to the local area. In 2008, at the start of this study, the Victorian government proposed to implement changes to the governance of TAFE institutes to "help them operate in the new environment, with a greater focus on demand-driven, customer focused provision" (Skills Victoria, 2008, p. 28). I felt that it was unlikely that management of other TAFE institutes would agree to participate in a study conducted by a researcher who was also a current staff member at one of their competitors. While other VET providers were subsequently invited to participate, as a consequence of the initial low participation rate at OMIT, only one other provider opted into the study. However, as autonomous institutes each Victorian TAFE has its own ethics approval process and therefore the time needed to consider and respond to my request may have been a factor in their apparent lack of response.

The decision to undertake research at my place of employment created two clear ethical issues. As I was likely to be teaching students who were also potential participants a significant ethical issue needed to be addressed. There were also the many pros and cons associated with insider research (Paul Hodkinson, 2005). Consideration of these issues led to the decision to only inform potential participants of the study, and invite

participation, after they had been officially deemed to have withdrawn from a Year 12 VCE Mathematics class.

No students opted into the study in the first ten weeks, the original projected data collection period and by the end of the first semester only one withdrawn student had volunteered to participate. Danielle's interview was analysed during semester two. To increase the number of potential participants in the study I decided to expand the intake to include all students who had been enrolled in a Year 12 Mathematics subject during 2009. As a consequence two more students elected to participate.

All three participants were from my Year 12 Mathematics class. This suggests that the initial rapport developed during class may have mediated any student concerns about issues related to the student-teacher power relationships. This confirmed Paul Hodkinson's (2005, p. 139) assertion that a degree of cultural proximity, between researcher and participant, may be an asset in interview situations involving the study of youth cultures.

A more detailed discussion of the limitations of the study will be outlined later in the chapter. In the following section I will outline some of the main findings and their implications.

7.2 Main findings and implications

The general conclusions outlined in this chapter are necessarily limited due to the small number of participants in the study. However, the diversity in the backgrounds of the participants, and their differing affective responses to a 'hard' school mathematics, provided some interesting insights. The effect of these insights on my current practice as a VCE teacher will be outlined later in the chapter.

The main findings are linked to the three research questions outlined in the Introduction chapter.

1. What was the decision making process that led to the student's decision to return to study VCE Mathematics at TAFE?

The three students interviewed for this study provide a cross section of the diversity of students who return to study VCE Mathematics at TAFE. Within the further education sector there is an assumption that students who return do so intentionally and have

clearly defined aspirations. The stories narrated by my participants suggest that, for many students, returning to study the VCE is not a voluntary or well researched pathway.

While each participant asserted ownership of their decision to return to study the VCE, this decision was often the result of choices which were limited by external factors. Their narratives of transition from schooling to work to reengaging with formal education highlight the success of government policies which promote the desirability of completing the VCE and lifelong learning.

While each participant experienced schooling differently their reflections generally focused on their perception of the irrelevance of schooling as a pathway into future careers. Leaving school and experiencing the world of work resulted in a re-evaluation of this attitude. Each participant asserted that while they often experienced work as physically challenging it wasn't intellectually challenging. For David and Ryu, unlike Danielle, leaving school coincided with leaving home and becoming independent. Thus establishing a degree of financial security trumped the desire to return to study. For both Ryu and David there was an interplay between the desire for financial security, a growing sense of agency and self belief, and dissatisfaction with the culture of their workplace. Eventually the pursuit of intellectual stimulation through extra curricula activities tipped the balance in favour of pursuing further studies. For each participant the VCE was presented as the only viable pathway which would enable them to achieve their career, and higher education, aspirations.

2. What are the factors and triggers that lead some students to withdraw, while others persevere with VCE Mathematics?

Having acted on the decision to return to study the VCE the student's successful reengagement with Mathematics is the next hurdle to be overcome. Previous research in the adults learning mathematics field highlights that interaction of affective, cognitive and conative factors which influence an adult's view of mathematics are complex and different for each student. This study identified that, for these students, a number of these factors have a greater influence on the transition process than others.

Unlike some previous studies, each of the participants self identified as being a person who liked, and was good at, school mathematics. They each professed to enjoy the

challenge and intellectual stimulation of doing a 'hard' mathematics subject. Subsequent discussions with Ryu indicate that he has continued to actively pursue his interest in mathematics after completing the Year 12 Mathematics subject.

Each of the participants identified that poor work habits had been a major factor in their lack of success in their previous schooling. This was also identified by Danielle as a key factor in her decision to swap to an easier Year 12 mathematics subject. In comparison both David and Ryu had returned to study with a strong sense of agency and were prepared to devote significant effect to skills development outside of class. In addition the men actively sought to develop a support network amongst their peers, colleagues and family. In comparison, Danielle responses suggested that she was isolated from most of her peers and family - "I don't really tell people how I do at school". This lack of support was compounded by a lack of other help seeking behaviours which are commonly associated with academic success.

The analysis and discussion of the participants' interviews identified that the work of Carol Dweck (2007b, 2010), on self theories of intelligence, may provide some useful approaches for further improving teaching strategies for some second chance learners. Since leaving school both David and Ryu appear to have developed the incremental mindset where challenges are expected, and accepted, as part of a learning process that rewards effort. Each of the men persisted and succeeded in their studies despite encountering significant personal issues during the year, whereas, Danielle appears to have a fixed mindset. She attributes her lack of performance in either Year 12 Mathematics subject to various factors, for instance, a persistent inability to do homework; a preference for concrete rather than investigative type question; and the reduced relevance of mathematics for her changing career prospects.

Thus one recommendation of this study is that mathematics teachers need to help students to consciously develop an incremental self-theory of intelligence. An earlier study noted that most adult students doing a Tertiary Preparatory Mathematics Course, at the University of Queensland, already displayed an incremental mindset and so "this issue is probably not relevant in an adult education context" (Carmichael & Taylor, 2005, p. 718). However, as the median age was 29 years it is likely that, like David and Ryu, these students developed their incremental mindset through a process of maturing

and ongoing adjustment to the workplace. In contrast, many TAFE VCE students are like Danielle. They are early school leavers who may have had limited exposure to the type of work and extra curricula experiences which provided the more mature students with their experiential learning opportunities.

As noted by Yorke and Knight (2004), the development of an incremental mindset is unlikely to be a rapid process for most students. Therefore this approach is likely to be more successful for those early school leavers who need to complete the full two year VCE program. However, I believe that if students are consciously aware of the objectives of this pedagogical approach then the transition may happen more rapidly for some students.

Both David and Ryu demonstrated that having an incremental mindset enabled them to pursue a strategic approach to learning mathematics despite significant gaps in their background knowledge. This has implications for teachers in secondary schools. If students have a greater awareness of approaches to learning and have developed the associated work habits then future attempts to reengage with education are likely to be more successful.

During 2010 I tested this hypothesis by changing the way I taught my Mathematical Methods classes at both Year 11 and 12. I provided students with a sample study timetable and encouraged reflection and discussion about what impact different approaches to study had on learning and performance. While this approach had little effect on student attrition for both classes, the students who remained in the Year 11 class remained more engaged throughout the year. This suggests that there is some merit in the idea that it is possible to help students develop resilience and hence promote a growth mindset (Dweck, 2007b).

3. What are the implications for policy makers?

For each participant the VCE was presented as the only viable pathway which would enable them to achieve their career, and higher education, aspirations. This has implications when considered in conjunction with the changes to the eligibility for government funded places in the VET sector which will affect VCE students from 2011. Under the Victorian Training Guarantee students are only eligible for a government supported place if they are under 20 or are enrolling in a course higher than their current

highest qualification (Skills Victoria, 2010b). The VCE is listed as a Skills Creation course at the same level as VET Certificate II courses (Victorian Skills Commission, 2010, p. 63). Therefore it is likely that many adult students, like Ryu and David, who need to complete or update their VCE credentials will be required to pay full fees, about $1,000 per subject compared to about $250 for a government supported place. The VCE dominates the selection process to Victorian universities, accounting for about 75% of offers (James, et al., 2009), therefore a student's potential to access higher education is improved by first attempting the VCE and keeping the TAFE Diploma pathway in reserve as a safety net.

7.3 Limitations of the study

McInnis et al. (2000, pp. 23-24) highlighted a number of "methodological issue in researching non-completion" in the higher education and VET sectors, including possible bias due to low response rates to surveys and a student's tendency to simplify their reason for leaving.

For this study the low response rate was the most prevalent and significant issue. The following information was provided by OMIT in the year following the data collection. In total there were 146 students enrolled in a Year 12 Mathematics subject during the study, 116 in Further Mathematics and 30 in Mathematical Methods. The overall withdrawal rate for Year 12 Mathematics for 2009 at OMIT was about 22% (32 students – 24 Further Maths and 8 Mathematical Methods). This was significantly lower than previous rates of withdrawal at OMIT, 37% in 2007 and 45% in 2008. However, the trend in withdrawals throughout the year adhered to the expected pattern with the majority of students, 27 out of 32, withdrawing during the first semester, the period from February to May.

Only one of these students, Danielle, opted into the study. Early school leavers who subsequently withdraw from a second chance to complete a desired VCE subject may have their "earlier feelings of inadequacy and failure" reinforced (McGivney, 2003, p. 13). The emotive atmosphere of Danielle's interviews suggests that, for students with negative experiences of prior schooling, this is a likely explanation for the low participation rate in this study. In addition to this low response rate it should be noted that all participants in this study were from my Mathematical Methods class.

As a result of the low participation rate all Year 12 Mathematics students were sent an invitation to participate in the study after the end of the year exams. A further two 'successful' students opted into the study. McInnis et al. (2000) assert that students who are interviewed by their teachers about their reasons for withdrawing are often reluctant to criticise the course, the institution, or "the teaching they experienced" (p. 24). However, Danielle, David, and Ryu's participation in this study suggests that a student's willingness to participate could also be influenced by their perception of the degree of connectedness with the researcher. To what extent can they be confident that their voice will be heard, valued and respected? During class I often share anecdotes from my own learning journey which probably established a sense of familiarity and shared values. However, establishing this connection with TAFE students is difficult due to the annual nature of enrolment in the VCE.

The part-time nature of the TAFE VCE course means that many students have competing demands for their time. Participating in a study ostensibly connected to their previous life was probably a low priority. Relaxing, working, and worrying about their future career and study options probably had a greater priority. While this is only conjecture, I feel that the low response rate for students who 'drop out' also may be due to similar reasons. For some students schooling has an identity which is "separate and removed from the reality of everyday life" (Lawy, 2002, p. 205). So when a student decides to withdraw from a course they are conceivably disposing of a 'product' that no longer has any relevance to their day to day life, and therefore there is no impetus to reflect on their experience. Therefore, if they have decided that the course is no longer relevant then a withdrawn student is likely to ignore any unsolicited communication such as the invitation to participate in the study.

Tinto (2005) suggests that a clear institutional commitment to enhancing student success is directly associated with student persistence. Similarly, my experience during this study suggests that students who have established this connection with an Institute are more likely to participate in studies about their experience of returning to study. Therefore, in any future research on this topic I would endeavour to establish a more substantial personal connection with any potential participants. However, to avoid potential ethical issues, I would recommend that this approach is only used with adult students who are over 18 years old. Firstly notify all enrolling students that a study

investigating the quality of the student experience will be inviting voluntary participants during the year. Then present a brief outline of the goals of the project at an information session. This would allow students to make a 'personal' connection with the person conducting the study without needing to initiate contact. Hopefully, this approach would establish a sense of commitment and improve the response rate.

7.4 Key Strengths

The outcomes of this study, while small scale, are important for a few reasons. The study contributes to the under-researched field of adults returning to study mathematics at senior secondary level. The study highlights how affective, cognitive and conative factors can interact to influence a student's successful reengagement with a 'hard' Year 12 Mathematics subject. The data analysis suggests that one's self-theory of intelligence may influence one's ability to study effectively (see Dweck, 1999). Students with a clear sense of agency, who have developed a volitional mindset and a strategic approach to learning, are able to overcome significant deficits of prior knowledge and successfully complete an academic year 12 subject.

The study also contributes to the debate on equity issues related to lifelong learning in light of the recent, 2010, punitive education policies of the Australian State and Commonwealth governments. The experiences of all three participants suggest that time is a critical factor in the development of an incremental mindset, and the associated sense of agency, especially for second chance learners who experienced school as problematic. For some adults this process may take years.

Using an approach informed by the attrition, retention and transition research field provided a brief glimpse of the "the quality of the total learning experience" for all participants, including one non-completer (McInnis, et al., 2000, p. 61). Thus, this study was able to represent the perspective of one of the "groups whose needs have clearly not been met" (Miller-Reilly, 2006, p. 248), those who drop out early in the course, and who have been missed in previous studies.

7.5 Recommendations for future work

One of the underlying goals for this study was to develop an understanding of the factors that influence persistence and non-persistence of adults undertaking a Year 12 Mathematics subject in a Further Education setting. In particular, I wanted to focus on

the unsuccessful second chance learners as the experiences of these students are an under-researched.

This study has provided some limited insights which need to be investigated and verified using a larger number of senior secondary students who do not persist in their studies. A mixed method approach, such as using surveys to inform students about the goals of the study before approaching them to participate in a follow up interviews, may be more successful in achieving an appropriate sample size. This may also be achieved by broadening the current study design to include any student who withdraws from a VCE subject, not just mathematics.

In the discussion chapter I noted how the life experiences of Ryu and David, the successful second chance learners, appeared to help them develop an incremental mindset. Within most Victorian TAFEs there is a potential pathway for early school leavers to progress to undergraduate study at university: CGEA (literacy and numeracy course), to the SSCE (such as the VCE or a Certificate IV equivalent), to a Diploma. As the majority of these students are often from socially or economically disadvantaged backgrounds there is considerable scope to explore how the metaphor of “learning as becoming” (Phil Hodkinson, et al., 2008) could inform the development of a pedagogy that could meet the needs of the many educationally disadvantaged student who have academic rather than vocational aspirations.

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