Student experience of undergraduate research projects: A perspective on Honours in Australia

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STATEMENT OF ORIGINALITY

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ABSTRACT

This exploratory study investigated the student experience across a range of fourth-year undergraduate research programs in an Australian university. There is currently great interest in the role of research to improve the national wealth and well-being, and until recently there has been little attempt to understand the relevance of fourth-year research projects within Australian higher education. The study focussed on the student experience of research, and how the journey prepared them for research-based work within their profession or for further research study.

The fourth-year programs offered were grouped into three categories: End-on Honours, Embedded Honours, and a research Project within a practice-based four-year program. Data were collected in two phases: firstly interviews with Coordinators of fourth-year research programs across 19 disciplines; and secondly distribution of a questionnaire to a sample of students completing an undergraduate research project in their fourth year at university. Student respondents to the questionnaire were predominantly full-time Australian students aged in their early 20s in programs across eight disciplines. The questionnaire focussed on research self efficacy, learning motivation, research environment and research orientation. The student research project experience was also explored through the concept of a research journey using visualisation as a tool for students to identify the high and low episodes of their research experience. Commonalities and differences in the journeys were explored using a mix of quantitative and qualitative data analysis techniques. These data provided insight into the impact of research-related tasks on the journey for students in different programs. One of the features of this study is the analysis by type of program, providing a representation of the student experience during their End-on Honours year, Embedded Fourth year projects and the Teacher Research Project.

The role of coordinators as stewards of the discipline emerged as a strong theme, with these senior staff members acting as gatekeepers and nurturing potential researchers within their discipline. Storied text illuminated the rich and diverse nature of fourth-year research programs offered at the site. Overall, students were motivated to complete their research, and were confident in their ability to carry out the tasks involved in the research process regardless of the program they were undertaking. They felt generally supported within their research environment, although those from Education conducting a smaller-scale research project felt they needed more support from their learning community.

A construct of ‘research preparedness’ was developed from several factors, namely research self efficacy, student motivation, research environment, relationship with academic staff, positivity towards the research journey and intention to continue on to further research. Fourth year students showed varying levels of preparedness for research, with male students more likely to show evidence of research preparedness than their female counterparts. Individual students in all types of programs typically experienced different trajectories in completing a fourth-year research thesis. On the whole students enrolled in an End-on Honours program were more positive about their research project at the start of the journey than those in other programs, had the strongest intent to continue on to further research studies and were more likely to show evidence of research preparedness.

There has been previously little attempt to investigate whether earlier experiences of a research project assists in better preparing students for the challenges experienced in doctoral research. Australia has a relatively unique approach to research preparation through the undergraduate Honours pathway, and as such it remains largely invisible in the global higher education landscape. Currently solutions are being sought globally to the issue of high attrition and non-completion in doctoral education, and how to ‘fast-track’ students into a research-focussed career. This study adds a concrete level of detail to our understanding of how the Honours year can assist to both identify students with strong potential and to attract young student researchers into further research studies.

1. THE ROLE HONOURS PLAYS IN AUSTRALIAN HIGHER EDUCATION

1.1. Introduction

Honours programs play a traditional role within the Australian higher education landscape as a transitional degree. These programs have evolved into a variety of forms which enable students in a range of disciplines to attain a competitive edge in their field, whether in a research or professional context. A distinctive feature of Australian universities is the expectation that research is undertaken together with teaching. The position of Honours at the nexus between teaching and research provides an opportunity for students to engage in research whilst they are still undergraduates. As knowledge grows in existing fields, and new fields emerge, a discipline-based approach to strengthening the quality of higher education learning outcomes is required. Indeed, there is a formal requirement (Bradley, Noonan, Nugent & Scales, 2008) that universities undertake research in all broad fields in which they offer coursework degrees and that academic staff are active in research in order to provide a scholarly environment capable of producing high quality researchers. As in every country, research is a key concern, tied to the well-being and wealth of the nation (Boud & Lee, 2009; Bishop, 2006; Nelson, 2005).

Most public sector research is done by universities. They also do most of the research training in Australia. We depend so much on universities, in fact, that if their performance slips, the whole innovation system suffers (Carr, 2009, p. 32). With the increasing attention being paid to research intensive universities and the continued thrust towards a research training agenda in Australia (House of Representatives, 2008; Manathunga, 2005a; McWilliam & Singh, 2002), it is timely to look at the early experiences of students involved in research. Early experience of research in undergraduate research projects and how these experiences link in to student's postgraduate research experiences need closer examination. Interest in student's experience in higher education settings has also grown; however, the literature is focused largely on the first year experience (Krause, Hartley, James & McInnis, 2005; Game & Metcalfe, 2003; McInnis & Krause, 2002; McInnis & Hartley, 2002; McInnis, James & Hartley, 2000; McInnis & James, 1995) and more recently on postgraduate research experiences (Leonard & Becker, 2009; Kurtz-Costes, Andrews Helmke & Ulka-Steiner, 2006; Holligan, 2005; Leonard, Becker & Coate, 2004; Conrad, 2003).

Although an Honours qualification is used to identify which students are most likely to succeed in research higher degrees, there is not a lot known about the scope of Honours research programs offered in different fields, how they are structured or about the numbers of students who are enrolled in these degrees. Furthermore it is unclear how many of these students then continue on to research higher degrees or take their research skills into the work force. Research skills are generally seen to be essential for successful operation in a global knowledge economy (Davis, Evans & Hickey, 2006) and to sustain lifelong learning and professional development (Waite & Davis, 2006). Nevertheless, the idea that professionals acquire a body of knowledge through a degree program and then apply that knowledge throughout their career is changing, with an increased emphasis on 'disposable, transferable and just-in-time knowledge' (Morley, 2003, p.7). This puts an emphasis on learning how to learn rather than acquiring a bank of lifelong disciplinary knowledge. Universities within a knowledge economy combine the vital role of teaching workforce-ready professionals and training the next generation of researchers in research and development as principal disseminators and creators of new knowledge (Cutler, 2008). In the current Australian context of higher education the doctoral degree takes many forms – the traditional PhD and professional doctorates with various combinations of coursework and research (Boud & Tennant, 2006).

Evidence suggests that achievement in coursework programs is not sufficient to predict success in research higher degrees, which require students to exhibit independence and creativity (Lovitts, 2008). In some countries new ways of identifying students with the capability to produce knowledge that is innovative and moving beyond the boundaries of the traditional modes of thinking are being explored (Tierney & Holley, 2008). In Australia, the Honours degree is a unique lens which can be used to identify and encourage students with the hidden potential to engage in research before they finish their undergraduate degree. The ranges of programs which have developed are contingent on the discipline, and many opportunities for students are linked with industry to encourage students to pursue a relevant and worthwhile topic of interest.

The diversity of this transitional degree enables a flexibility which can be used to 'leapfrog' promising researchers into the knowledge production industry (Harkins & Kubik, 2006). Honours degrees awarded at the highest level, First Class Honours, are used as the gold-standard for competitive PhD scholarships (Kiley, Moyes & Clayton, 2009). They can 'fast-track' a successful student into a doctoral research program in a trajectory that is more rapid than options accessible in other countries, and furthermore drive young researchers into a research-focused career. In Australia, there is research to suggest there is a decline in the production of researchers in general, in addition to the aging academic workforce in universities and the lack of younger researchers ready to take their place when they retire (Hugo, 2008).

Australia currently adopts a widespread use of the Honours system to prepare students for research, and as a pathway to the academy. The Honours system in Australia, which incorporates a research thesis, allows outstanding graduates to continue straight into the doctorate without completing a Masters Research program. These students also have access to scholarship opportunities given that Honours is seen as a predictor of success in doctoral study. However, not a lot is known about the experience gained during the research project, least of all whether it prepares students for further research in their discipline.

As the debate on transferability and compatibility of higher education programs intensifies globally there is a pressing need to consider pathways. This has also been noted by Neumann (2009) in her work on the doctoral experience and Kiley, Cantwell, Manathunga & Boud (2008) in their exploratory work on the role of Honours in contemporary Australian higher education. To provide a background to the study, this chapter will now examine the significance of Honours within the global landscape of higher education and explore the emergence of research and growth of professional education as the province of universities in Australia. The chapter will then probe more deeply into the definition, scope and role of Honours, the significance of the study and then present the key terms used in this thesis. Chapter Two will then go further to explore the literature in relation to what is known about undergraduate research programs and student's experience of research.

1.2 Global discussions on higher education

Within the Asian-Pacific region there are strong intentions to enhance global competitiveness, with increased interest being shown in re-structuring national higher education systems in the quest to produce one or more 'world-class universities' (Deem, Mok & Lucas, 2008). Countries such as China, Taiwan, Japan and Hong Kong are strategically approaching this university-ranking exercise, placing a heavy weight on research performance both on a national scale and within institutions, outlined at length in Mohrman (2008) and Deem, Mok & Lucas (2008). Research universities are also becoming more international in their strategies by aiming to reach the top tier of research universities worldwide, referred to as the 'Emerging Global Model' of the research university in the twenty-first century, which are focused on the discovery of new knowledge and the development of the next generation of scholars (Mohrman, Ma & Baker, 2008).

The increased interest in becoming a world-class research university, and in particular to be ranked in the University Leagues, has intensified the focus on research performance. This endeavor was also evidenced in Europe through the Lisbon Strategy, intending to build the European Research Area as a means to strengthen European research capabilities collectively rather than as individual nations. The focus was to make Europe 'the most competitive knowledge-based economy and society by increasing the number of researchers and enhancing research capacity, innovation and economic growth' (Bitusikova, 2009, p.201).

This global outlook sets the scene for the current developments in higher education in Australia though there is a greater emphasis on the restructuring of the higher education system. It is argued that addressing key issues in higher education reform raised by Bologna will place Australia and our partners in this region at the forefront of future education developments (James, Meek, Harmon & Van der Lee, 2008) and that Australian higher education has much to gain, both domestically and in terms of its international education objectives, by taking steps in parallel with the Bologna Process (Bishop, 2005).

The Bologna Process refers to the harmonisation of European higher education across 46 countries to improve the transferability of degrees within the European education arena and to strengthen the overall quality of graduate programs offered. Three key phases have been developed – the first phase is a three-year Bachelor degree, the second phase is a two-year Masters degree and the third phase is a three-year Doctorate. In the second phase, students are able to build on their more general three year undergraduate degree to become either a professional in the disciplinary area or to conduct research in the area. The third phase is then focused on doctoral education, again either through a professional doctorate or a research-based doctoral program (Bologna Declaration, 1999). In this structure, research is undertaken in the second phase through a Masters degree, and then students have the opportunity to continue their research through undertaking a research doctorate in the third phase. Doctoral education has been closely related to the policy directions of the Lisbon Strategy, mentioned previously, and is viewed as the 'cornerstone' in meeting these objectives through the training of young researchers (Bitusikova, 2009).

There is concern that the new European model of the three cycle degree structure (see Figure 1) will affect the general influx of international postgraduate students in Australia and in the US, as European universities will be unwilling to accept students into their Graduate Schools with a three-year first degree. Figure 1 compares the average time taken to complete the three cycle degree structure in the European Bologna model, with the US/Canadian and the Australian models. The ability to 'fast-track' the research degree cycle through completing a successful Honours program in Australia is highlighted, giving students the option of a four-year undergraduate degree followed by a three-year doctorate. Compatibility of programs is a growing issue, particularly in the area of graduate education, and the issue of defining best practice.

This has led to a greater emphasis on transatlantic discussions between American, Canadian and European stakeholders and a new vision of the 'shrinking' world of higher education brought about by 'market forces, globalisation, internationalization, competition, new providers and cost efficiency' (Green, Eckel & Barblan, 2002, p.3). The American-based Council of Graduate Schools held a Strategic Leaders Global Summit in Graduate Education in Banff, Canada in 2007 with representatives from Australia, Canada, China, Europe and the US. Key points of agreement were formed to provide a foundation for ongoing global dialogue; these are now referred to as the Banff Principles on Graduate Education.

US/Canadian Model

4 years Bachelor (BA, BS, B.F.A., B. Eng., B. Phil., B. Arch.)	5 years PhD	
	2 years Discipline-based Master	3 years PhD

European Bologna Model

3 to 4 years Discipline-based Bachelor (180-240 ECTS credits)	1 to 2 years Discipline-based Master (60 to 120 ECTS credits)	3 + years PhD

Australian Model

4 years Discipline based Bachelor	2 years Discipline-based Master	3 years PhD
3 years Discipline based Bachelor + 1 year Honours program*	2 years Research Masters	3 years PhD

*Student with high quality Honours progress to PhD

Figure 1: Average timeline of the three cycle degree structure

At the 2008 conference on the Quality of Postgraduate Research that is held biennially in Australia, invited representatives from Europe, US, China and Australia focused on *Research Education in the New Global Environment*. From discussions at this forum it was clear that Australia has a number of advantages in graduate education, such as:

- equal accessibility for all students;
- national doctoral guidelines, oversight of programs and qualifications through the Australian Qualifications Framework;
- national quality assurance measures such as the Australian Universities Quality Agency (AUQA) which is operated independently from governments and the higher education sector;
- consistency of practices and benchmarking by national ‘advisory’ groups overlooking postgraduate studies such as the Deans and Directors of Graduate Studies (DDOGS).

The promotion of the transferable skills of Australian research students and the clarity of pathways to graduate research programs are areas which require more discussion and explanation in light of Bologna and the impact on building the academic workforce. The structure of the Australian first and second degrees (Bachelor and Master respectively), while not a perfect match, does approximate the preferred degree framework of the Bologna Process. While in principle the first degree is a three-year program, four-year programs with an element of professional training and external accreditation already occur within Australia. The Australian Honours year exhibits the major point of difference between the current first-degree structure and that proposed by Bologna. There is a need to further investigate the unique approach to research preparation through the Australian undergraduate Honours pathway.

To promote the compatibility of Australian degrees overseas, the federal government has proposed a national template for the provision of an Australian Graduation Statement (AGS) from all Australian universities (James et al, 2008). This statement will give details of the graduate, the award being conferred by the university, a list of the graduate’s achievements and a description of the Australian Higher Education system.

Although the qualification of Honours is identified in the AGS within the description of the award of PhD, there is no explicit acknowledgement of the Honours-year program.

> Admission to this course is available to students holding a Masters degree by research or a Bachelors degree with first class Honours or second class Honours division A, or equivalent in a relevant discipline. (James et al, 2008, p43)

Given the lack of further specification we can assume that Honours programs are within the category of Bachelor degree specified by the Australian Qualification Framework (AQF). However, this acknowledges only the level at which the degree is conferred rather than detail the type of Honours program which was undertaken. Feedback noted in the proposal raised confusion about the nature of Honours and the level of Honours award and how it fits into the Australian Higher Education system (James et al, 2008).

One Australian university response to the Bologna Declaration was that of the University of Melbourne. According to their promotional material on the New Generation Undergraduate Degrees titled ‘The Evolution Starts Here’ the new undergraduate degrees they have created will align them to ‘the best of European and Asian practice and North American traditions’ (University of Melbourne, 2005; 2009). The new degrees follow the European model outlined above. A three-year generalist degree, followed by a two-year Masters program in either a discipline-based or research-based field, followed by a three-year doctoral program. However, other Australian universities have made no major changes to their degree patterns.

The global push to restructure higher education, particularly in Asia and Europe, has provided an impetus for the Australian government, and universities themselves, to examine current pathways to doctoral studies and to enhance research performance. It is pertinent to review the emerging interest in research in Australia and the growth of professional education.

1.3 The emerging research agenda in Australia

Research has been brought to the fore in higher education in Australia through changes in government policy and funding. A White Paper (Kemp, 1999a) identified the government's renewed focus on research and research training, in particular the importance of attracting quality Australian and international students to be 'nurtured' in an environment providing relevant experience, delivering high quality learning and valuing creativity and talent. Concerns with quality of research training discussed in the paper, which are also of interest in this study, were that some research training environments were associated with poor supervision, inadequate levels of departmental support and limited access to quality information. Another concern was the high attrition rates and slow rates of completion for research students. There was acknowledgement of the changing role of the university in training individuals not just to be academics, but to undertake research in non-university settings, as increasingly industry became knowledge based and training oriented (McWilliam, Taylor, Thompson, Maxwell, Wildy & Simons, 2002).

The higher education sector is currently changing rapidly, both in the global and national arena, as discussed earlier in this chapter. In Australia the shift has encompassed a change in direction, from a policy that ensured all universities offered a broad range of disciplines accessible to all students towards a tiered system which aims to create differences between institutions. Most recent policy changes include the introduction of some full-fee places in universities, underpinned by student government-funded loans similar to the US system (Marginson, 2003). Overarching this is the repositioning of universities around the world to increase their research output, and in many cases the creation of Emerging Global Model universities whose focus is to produce world-class researchers (Mohrman et al, 2008). This is particularly the case in China, where places in higher education have increased by 458% in less than a decade (Mohrman, 2008, p.31), and in Europe with the creation of the European Research Area where staff and students will be able to move freely between countries to concentrate knowledge and resources in a smaller number of institutions (European University Association, 2005).

The issue of academic workforce mobility is currently being debated in Australia (Neumann, 2009; Lee & Boud, 2009) following the changes in Europe and more recently the decision in England and Wales to allow higher education institutions to concentrate on a narrower range of disciplines and to become specialised in either research or teaching. Australian universities are mandated to provide a wide range of disciplines, and to provide both research and teaching. It has continued to be argued that the connection between research and teaching is important in order for scholarship to develop (Bradley et al, 2008). In countries with small populations, such as Australia, any change to the mandate would be likely to exacerbate the developing shortage of high quality researchers.

PhD enrolments represent substantial investment for governments and universities, as increased science and technology capabilities in industrial nations are linked to economic growth and international competitiveness (Mohrman, 2008; Clark, 1993). Enrolments in PhD programs were low in the 1960s, and in 1975 were around 5000. This number has grown to 27,996 in 2000, almost tripling within 25 years. In 2000, the government allocated $545 million to support training postgraduate research students, with a further $94 million allocated to fund Australian postgraduate awards and international postgraduate scholarships (Harman, 2003). The current number of doctoral research students in Australia is around 42,000 (DEEWR, 2007).

There is no indication that the Australian government and the universities want this growth to stop, especially given the aging academic workforce (House of Representatives Report, 2008). So, attention is being directed into how to further increase the number of students enrolling and completing PhDs, and how to ensure that students are attracted by this as a career. In Australia, a student's research career traditionally begins in the undergraduate phase of higher education. When capable students make above average academic progress in their Bachelor degree they are able to enrol in a year-long fourth-year Honours course to concentrate on a research area they wish to specialise in within their degree. This course is traditionally based on the completion of a research thesis, and is often complemented by research training specific to that discipline. However, with the changes to the higher education system brought about by the end of the binary system, and the growth of professional degrees, the fourth-year undergraduate research project has evolved to accommodate new demands.

An initial investigation of Honours programs in Australian universities (Kiley, Moyes & Clayton, 2009) was undertaken across five Australian universities, involving semi-structured interviews with Honours Coordinators and Honours students. The first traditional role identified was that Honours provides training for further research, whereas the other role more generally prepared the student in the discipline or professional area. More recently a more extensive examination of the pathways of Honours in Australia, carried out by the Australian Learning and Teaching Council (previously the Carrick Institute), has reiterated that the definition of Honours is broad. Three main roles of Honours were identified: the research pathway, the professional pathway and academic enrichment (Kiley, Boud, Cantwell & Manathunga, 2009). The study found that within these programs there were core characteristics: advanced disciplinary knowledge, research training and a substantial independent research project.

The study also found that a key observation that surfaces when considering the Australian Honours system in a global context is that the uniquely Australian Honours qualification is highly valued within the Australian higher education sector but poorly understood outside of it. There are a diverse number of professional pathways which have developed alongside changes to the higher education system in Australia and particularly professional education. This will be explored in the next section.

1.4 Importance of professions to the development of research

Professional Education in Australia represents the first step towards entry to a 'profession' (Higher Education Council, 1996). In order to become a professional an individual requires specialist skills gained only by extensive education and training (Curry and Wergin, 1993). There is usually restricted access to professional degree courses, with closely controlled entrance and exit requirements. Aldred, Aldred, Walsh & Dick (1997) argued that the quantity of knowledge required for professional practice led to the undergraduate curriculum being viewed from an increasingly instrumentalist perspective and resulted in reduced capacity for critical thought amongst graduates. There is growing recognition that contemporary professional life requires skills that cannot be developed in a traditional style of university course.

In Australia, the Aulich Report (June 1990) was very critical of universities claiming they produced graduates in the profession who all too often were 'not analytical, creative thinkers, whose education does not provide the basis for adequate flexibility, who are not sufficiently attuned for the need for 'lifelong learning', and who are not good communicators' (p.viii). There is evidence from the Discipline Reviews (also quoted in the Aulich Report) that employers are not just looking for subject competence, but for transferable skills and sensitivity to social contexts (Moses & Trigwell, 1993). One response to these concerns has been the introduction of problem-based learning (PBL) into professional education and the focus towards industry-based knowledge (McWilliam et al, 2002). Professional education is partly regulated from outside the university (Marginson, 1997). Accreditation bodies of professions such as the Australian Institute of Builders (AIB) in the Construction Management industry have control over what up-and-coming professionals are being taught at university. There has been an increase in the value of competency standards in the professions, which has influenced learning outcomes of tertiary institutions also.

The link between universities and the professions is complex and changing rapidly. There is a greater application of quality assurance processes both within the universities and within the professions themselves. The professional bodies believe they should have greater involvement in determining the minimum level of requirement for entry into the profession. Demands are placed on universities regarding entry-level course content and structures by the professional bodies who advocate the professional graduate must have certain levels of competencies in order to work in the profession. Increasing requirements for professional practice to be based on competencies, rather than completion of an entry level qualification, have the potential to change the future relationships between the professional bodies and the universities, and may lead to a greater focus on outcomes rather than inputs (Higher Education Council, 1996).

Fourth year in professional degree courses in Australia is important in this context, and parallels the End-on Honours program in the more traditional disciplines, in that the industry-based fourth-year project allows students to coalesce all the knowledge and skills they have learnt in their undergraduate degree and apply them in a workplace setting. The project also develops graduate skills such as communication, team work and critical thinking. Good students have an opportunity to narrow their specialization and to plot the next move in their research path by choosing a topic with enough scope to develop their resume and networking opportunities. The focus is on the transferable skills students are learning within their degree program because industry demands graduates who ignore disciplinary boundaries to investigate real-life problems, finding creative ways to gather information and the sensitivity to the specific context of what is being done.

The research doctorate, which was once the domain of an elite few, has 'become a professional qualification across a wide range of high-order intellectual, professional and work domains' (Boud & Lee, 2009, p.3). A new range of professional doctorates have emerged in response to the changes, including professional and practice-based doctorates which are commonly profession-specific and act as advanced training grounds for particular professional groups (Park, 2007). Some question the validity of these wide-ranging professional doctoral programs, mainly in Europe where the most crucial element of a doctoral program is the originality of research, the high quality of research training and the transfer of the skills and experiences of the doctorate to the workplace (Bitusikova, 2009). Nevertheless, the changing nature of the doctorate and consequently the qualifications leading to the doctorate, particularly the undergraduate pathways, are of interest in the Australian context.

1.5 Undergraduate research programs

In this section, undergraduate research will be explored initially in terms of the global context, and then specifically looking at undergraduate research programs within the Australian higher education system. Given the unique nature of Honours within the Australian higher education system, the definition of Honours and the current trends will be explored in light of the role they are perceived to play. Empirical research on how students experience their final projects in undergraduate research will then be detailed, with a view to specifying the gaps in the literature in the area of undergraduate research projects which have formed the basis of this study.

1.5.1 The global context

As indicated previously, there is a global focus on increasing the equivalence of degrees in higher education leading to a more dynamic and flexible system of recognising degrees (Hunt, 2009). To enhance competitiveness, European universities in particular are promoting higher education programs which are more transferable across the sector (Johnson & Wolf, 2009). In Europe, key stages have been defined to enable a clear pathway for students, allowing them more flexible options to pursue research interests with the most qualified academic staff and to engage in world-class research programs (Chambaz, 2008). The policies governing global higher education systems impact not only on research students but also on the recruitment of research-focused academic staff in universities.

In light of the restructure of higher education programs across Europe, a group of researchers conducted an extensive investigation of Honours programs in the Netherlands (Van Eijl, Wolfensberger, Schram, & Pilot, 2005). They identified 24 Honours programs within Bachelors and Masters Courses and categorized them as: disciplinary-based (18); interdisciplinary (5); and Honours College (1). The identified purpose of the Honours programs in the Dutch universities was to broaden perspectives, offer extra challenge, strengthen academic skills and increase creativity in students. The Honours programs were essentially designed to develop talent in gifted students, and there was no reference to inclusion of research projects or an overall role in developing research skills.

Similarly, in the United Kingdom (UK) a classification system is currently used to differentiate between the academic performance of students, where the highest level of performance is conferred with Honours (Class I, II, III). Honours degrees in the UK do not necessarily indicate that students have experienced scholarly research within their discipline, rather the term has come to mean that they have completed a standard undergraduate program with excellent results. Recently questions have been raised about the validity of the system, particularly given that assessment practices to determine the classes of Honours have been demonstrated to be inconsistent (Elton, 2004).

There is a paucity of studies which detail the extent to which programs include research and report on the experiences of undergraduate researchers. The studies generally fall into the quality assurance category and have limited value in terms of generalisability because they are essentially small scale and limited in scope. There are a small number of articles relating to Honours in specific disciplines. A study in an English Medicine faculty found that the Honours year encourages entry into academic and research careers and that the type of Honours strongly influences the choice of speciality (Nguyen-Van-Tam, Logan, Logan & Mindell, 2001). Another paper from England, based in the professional field of social work, questions the benchmarking approach to the discipline in response to the Quality Assurance Agency for Higher Education (QAAHE) released in 2000 in terms of how social work students should be taught in the new Honours degree program (Prior, 2005).

There has been substantial work conducted in the UK by Healey & Jenkins (2009) on the importance of research and inquiry in the undergraduate curriculum. Undergraduate research in this sense refers to opportunities to develop the skills required for research within programs offered so that a research-active curriculum is a part of the mainstream offerings in UK higher education institutions. A capstone research project has been proposed as part of the National Teaching Fellowship Scheme funded project at the University of Gloucestershire titled 'Leading, promoting and supporting undergraduate research in the new university sector', which would directly engage students in the kinds of outcomes achievable in the Australian Honours program.

Similarly in the United States there has been a movement to increase the opportunity for undergraduate research. The report from the Boyer Commission (1998) on Educating Undergraduates in the Research University '*Reinventing Undergraduate Education: a blueprint for America's Research Universities*' has seen a renewed focus on undergraduate research within a variety of institutions, but particularly in the research universities. A national group called the Council on Undergraduate Research (CUR) was established to work across the variety of higher education institutions to raise the profile of undergraduate research. There are currently individual and institutional members representing over 900 Colleges and Universities, with most members being science based. There is also a separate group which promotes national undergraduate scholarly activity through an annual national conference called the National Conference on Undergraduate Research (NCUR).

A review of the articles from the CUR journal over the past five years shows that academic faculty from the science-based disciplines have been more active in investigating avenues for providing students with opportunities to engage in undergraduate research (Hunter, Laursen & Seymour, 2006; Seymour, Hunter, Laursen & Deantoni, 2004). However, the definition of 'research' is undefined and covers cursory research experiences such as being mentored by a researcher, involvement in a small scale research exercise or researching as a part of a group. In Australia, a student is required to enrol in an independent, substantive investigation in their final year specifically devised to provide relevant research experience within their discipline of study. In the literature reviewed, the research experience for student in the US is more likely to be provided in programs operating outside the undergraduate curriculum.

Moreover, capstone research projects undertaken as a part of the undergraduate curriculum in the US are not reported frequently. Studies which explore ways to offer the research experience outside the regular curriculum (paid assistants or volunteer summer program) are more prominent. Dominick, Buffington, Rowland & Warren (2000) reviewed 400 articles on undergraduate research in the US and concluded that most 'simply accepted the proposition that research was whatever a faculty member and student decided it was' (p.5). There are problems therefore in comparing findings with Australian studies.

In reviewing the international arena it is clear that although there may be growing interest in undergraduate research, particularly in the US, there is little empirical research investigating student's experiences with undergraduate research projects. Honours is used in the UK and the Netherlands to differentiate the brightest undergraduate students, however, there is no requirement for a research project in their fourth year. Given the uniqueness of the research project as a part of the undergraduate curriculum in Australian Honours, it is pertinent to examine the definition of Honours and what is known about the types of Honours programs offered.

1.5.2 The 'definition' of Australian Honours

Historically there has been little effort to define the range of Honours programs in operation across Australian universities. Some programs have developed almost organically, dependent on professional and industry-based needs, particularly in the newer disciplines such as Health Sciences. Only recently has the definition of

Honours gained impetus in discussions about the future directions of Australian higher education, in response to the global changes in higher education (Innovative Research Universities, 2006; Bishop, 2006; Australian Technology Network of Universities, 2005).

An attempt was made in Australia in the late 1980s to develop national benchmarks to monitor academic standards in degree courses by the Australian Vice-Chancellors Committee (DEST, 2002). The original plan was to develop twenty panels to monitor standards in degree courses, but only seven were established. Reports were published in the areas of Physics (AV-CC, 1990); History (AV-CC, 1991); Economics (AV-CC, 1992a); Psychology (AV-CC, 1992b); Biochemistry (AV-CC, 1993a); Computer Science (AV-CC, 1993b); and English (AV-CC, 1994). The Commonwealth Tertiary Education Commission had also conducted discipline reviews, but these were discontinued in 1991.

In the late 1990s Honours was defined in an elementary way for the purpose of identifying a framework to make the pathways in higher education more transferable (Ledgar, 1996). The terms *Honours Degrees* and *Degrees with Honours* were identified as the two pathways for students within the Australian Qualification Framework (AQF). *Honours Degrees* referred to the year long program following a three year bachelor degree, requiring a high level of academic achievement for entry. Examples included the disciplines of Science, Arts and Commerce. *Degrees with Honours* refer to an award for a student completing a degree of four or more years with outstanding academic achievement. These were awarded in most professional degrees, including Education, Engineering and Law.

At a similar time, the Australian Vice-Chancellors Committee published a set of Fourth Year Honours Programs Guidelines for Good Practice that defined Honours as an add-on fourth-year program which follows a three year bachelor degree (AV-CC, 1995). The document outlined the primary goal of an Honours program as research training, with the thesis component of most final-year programs falling in the 30-70 per cent range. The document also stated that academics involved in supervising Honours candidates should be active researchers with a sound background in research, and where appropriate, substantial involvement in supervision by qualified non-academics (for example industry) should be encouraged.

Traditional Honours programs had solely aimed to support the transition between the undergraduate degree and research candidature. With the changing nature of degree pathways and delivery due to the increase in professional degrees and the rise in enrolments, Honours programs evolved to reflect the needs of stakeholders, and took on a variety of forms and roles. Some of these new programs, for example, integrated an industry-based project into the fourth year of the undergraduate degree. Mapping programs both across and within disciplines has proved difficult. In the United Kingdom in 2000 the Quality Assurance Agency developed a series of benchmark statements at the level of the bachelor degree with Honours. Groups were formed in the main areas of study, bringing together academics, associations and professional bodies. The process produced statements for 47 subject areas, however, in execution this process proved to be labour-intensive, expensive and slowed by debates over levels of specificity or generality in the different subjects. This in itself reflects the inherent complexity of the provision and the range of expectations in Honours.

Recently the benchmarking process has been replicated within one discipline in Australia - Archeology. In 2006 benchmarking of Archeology Honours degrees at Australian Universities was carried out by the Australian Learning and Teaching Council, which aimed to consolidate information about the degree through meeting with the key stakeholders such as academics across different institutions and employers (Beck & Clarke, 2008). With renewed interest in Honours programs in Australia, the study by Beck & Clarke (2008) may provide a template for a detailed investigation of Honours within disciplines, particularly professional degrees.

In the last decade there has been little progress in defining an overarching framework for the increasing range of Honours programs available for students across disciplines. Following the release of the AV-CC guidelines for Honours programs in 1995, many universities developed policy documents for Honours incorporating the guidelines. A scoping of Australian university websites was undertaken as a preliminary part of this study in 2005 which indicated that policy governing Honours had not changed significantly. Each website was searched for general policies relating to Honours which incorporated all disciplines. In those universities which had clear policies in relation to Honours, some different terminology was employed for the programs. A sample of the terms used is presented in Table 1, purposefully selected to demonstrate the differences.

Table 1: Examples of terminology describing Honours programs found in university policy in 2005

University	Traditional One Year Programs	Four Year Bachelor Program
University 1	**Add-on Honours course** A one year (or full-time equivalent) course that leads to the award of a Bachelor degree (Honours) and is undertaken subsequent to (but separate from) a three-year Bachelor degree course upon which it builds	**Integrated Honours course** A four year Bachelor degree course that has built into it an Honours stream, the completion of which leads to the Bachelor award (Honours) in the title
University 2	**An Honours Degree** Is awarded following the completion of a one-year stand-alone Bachelor Honours degree course that is only available for students who have completed a three-year bachelor pass degree in a similar field of study, with a record of high achievement in their undergraduate studies	**A Degree with Honours** Is awarded following the completion of a four-year or longer course, or a graduate Bachelors degree course, by a student with a record of high academic achievement from an early stage of the course who has taken a more demanding academic program during the latter stages than that required of a student undertaking the course as leading to a pass degree
University 3	**End-on Honours program** A year-long (or equivalent) program following completion of the relevant pass degree	**Concurrent Honours program** Concurrent Honours programs are current with the pass degree and applicants do not need to submit an Honours application form. Available for certain courses offered within the Faculties of Architecture, Landscape & Visual Arts; Engineering, Computing & Mathematics; Law; and Medicine & Dentistry

The first column in the Table, for example, has the same definition for the one year Honours program, but has three different names for it – Add-on Honours, An Honours Degree and End-On Honours. The second column describes the four year degree program; however, the definition of the program as well as its label differs in all three instances. The integrated Honours has an 'Honours stream' which students need to complete, the Degree with Honours identifies students early in their Bachelor degree on merit and allows them to complete a more demanding program, and the Concurrent Honours program allows students to self select courses for the Honours qualification.

A similar scoping exercise was carried out by Zeegers & Barron (2008a), where an internet web search of Honours programs across Australian universities was conducted. Although the methodology lacks some detail about how the scoping was carried out, they nevertheless confirmed that there is a lack of consistency in the application of policies and procedures in relation to the implementation of Honours.

Another recent study by Kiley, Moyes & Clayton (2009) employed a more systematic approach across five different universities, where the varying views about the purpose of Honours programs were investigated through interviews with recent Honours graduates and Honours Coordinators. They concentrated on two disciplines in each of the universities, one in the biological sciences and one in humanities. Results showed that there were different perspectives dependent on the interviewee, with the Coordinators generally discussing how research conducted at Honours level contributed to the discipline and the students generally focusing on a personal perspective in terms of their well being and the support given by the learning community. Kiley et al (2009) also found that there was variation in purpose, with many of the programs in the study undergoing changes in order to adapt to the needs of students or the workplace.

1.5.3 The 'scope' of Australian Honours

It has been difficult to track current trends in Honours considering that there is little data available on a national level detailing the number of degrees awarded with Honours, or on the number of students in fourth year completing a major research project. The Federal government through the Department of Education, Employment and Workplace Relations (or DEEWR, formerly DEST and DETYA) has reported the number of 'Bachelor Honours' students through the

Higher Education Statistics released on an annual basis since 2000. The 'Bachelor Honours' students are defined as being those completing a one year full time equivalent Honours program after the completion of their Bachelor degree.

In 2007 there were 663 847 students enrolled in Bachelor degrees, and 11 860 (18%) of these were Bachelor Honours students. The main groups of Bachelor Honours students were distributed over the following 'Broad Fields of Study': Education: Society and Culture (40%); Natural & Physical Sciences (30%); Creative Arts (9%); Management & Commerce (7%); Health (6%); and Information Technology (3%) (DEEWR, 2007, Table 21).

The graph in Figure 2 serves to show the marked differences in distribution of Honours students by broad fields of education in comparison to the number of students engaged in research higher degrees. It was clear that most research activity at the highest level in Australia occurred in the broadly defined areas of Society and Culture (25% of Doctorate by Research students) and Natural and Physical Sciences (21% of Doctorate by Research students).

These were also the areas where there were the most students enrolled in traditional End-on Bachelor Honours degrees. Health and Engineering, both Professional degrees, had the next largest proportion of doctoral research students of 13% and 10% respectively. The majority of undergraduate programs in these areas are four-year degrees, with a research project integrated into the fourth year of study. As such the number of Honours students enrolled in End-on programs in these areas was very low, with a larger proportion of Masters by Research students in the field of Engineering, Health and Education. This indicates that there are other important pathways to the doctorate which vary depending on discipline.

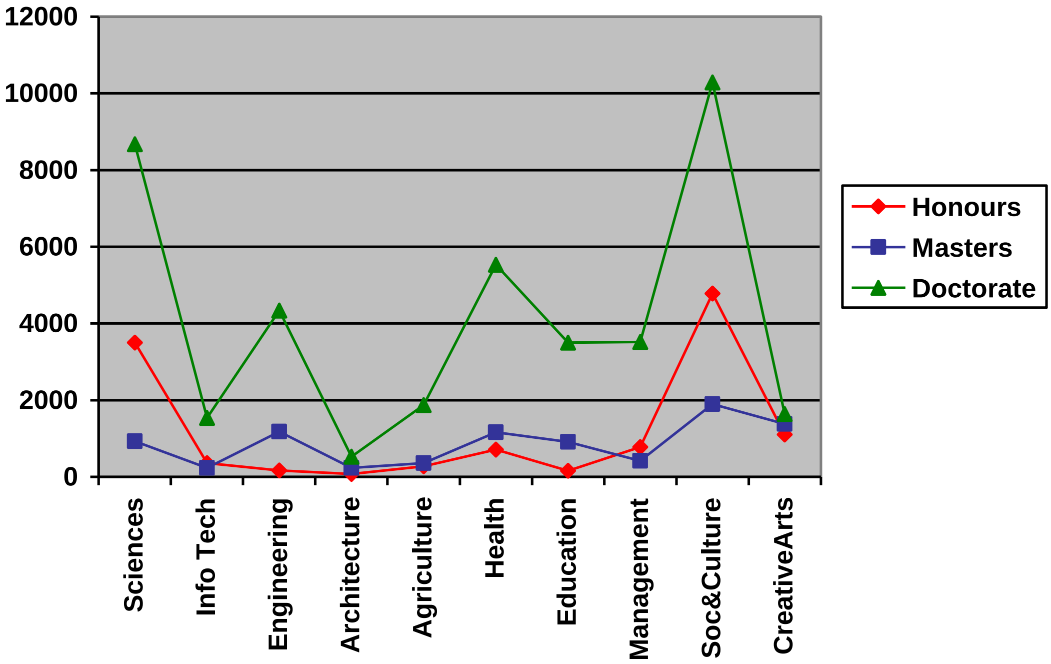

Figure 2: Student enrolment 2007: Bachelor Honours, Masters by Research, Doctorate by Research (DEEWR, 2007)

It could be construed from these data that a larger proportion of students enrolled in Honours degrees may translate to higher doctoral research numbers. There have been studies which have investigated the factors which influenced Honours students in continuing to doctoral degrees. Mullins (2006), in an in-house investigation at the University of Adelaide, disseminated an on-line questionnaire to all students enrolled in an Honours program. There were 295 respondents indicating a 52% response rate, across a range of disciplines. He found that universities should focus on undergraduate recruitment strategies to increase student's interest in completing a PhD, with the most effective strategy being a personal approach by academic staff. Kiley & Austin (2000) conducted surveys with 546 applicants (58% response rate) for postgraduate research scholarships at five Australian universities to investigate the factors influencing mobility. They also found that a personal connection with academic staff was a significant factor in determining whether students would complete their doctoral study in a particular university, with the Honours supervisor most likely to have influenced their decision.

The role of Honours as a recruitment strategy for postgraduate education is one which therefore has some merit. Neumann (2003) conducted a large scale study on the doctoral education experience in Australian universities. She conducted 130 interviews (one third supervisors, two thirds doctoral students) across four different disciplines in six universities. She found that a well-established Honours program in a research intensive department was important for recruitment of doctoral students from within their own undergraduate student populations. Neumann and Boucher (cited in Neumann, 2003) conducted a Higher Degree Research Candidature Management Project at Macquarie University which was focused on improving the first year research experience. They also found that many commencing Masters and Doctoral students said they were influenced by their Honours year research experience or their Honours supervisor to continue to postgraduate research studies.

There is an indication in the literature that the quality of relationships formed with academic staff during Honours increases the connection with the learning community and consequently increases the intention to continue on to further higher research degrees. Research suggests that the Honours experience, particularly the academic staff involved in Honours, have an influence on the intention to continue on with postgraduate research study. Honours programs often form a transition within a discipline between undergraduate and postgraduate research study. However, given the inconsistencies in defining Honours and the varied scope of programs which are emerging, the role of Honours is still unclear. The next section investigates what is known in the literature.

1.5.4 The 'role' of Australian Honours

Research in higher education is an area increasingly attracting attention due to the changes in policy relating to university funding. A discussion paper, *New Knowledge, New Opportunities* (Kemp 1999a), and the policy statement *Knowledge and Innovation* (Kemp 1999b), located higher education research and research training as central to the Government's reforms of the higher education system. The policies announced the move by government to include research student completions as a key measure in calculating institutional research block grants and Research Training Scheme (RTS) funding. This new direction highlighted the economic cost involved for institutions with high attrition and low completion rates for their higher degree research students. Subsequently this has been reinforced in the concerns about recruitment of new academics (House of Representatives, 2008; Bradley et al, 2008).

Of interest therefore to both government and universities is the experience of students completing research degrees, particularly in terms of attrition and timely completion (Rodwell & Neumann, 2008; Lamm, 2008; Newmann, 2003; Borthwick & Wissler, 2003). The nature of postgraduate research training in universities is changing rapidly, highlighting the skills and attributes the graduates take with them when they leave university (Manathunga, Lant & Mellick, 2007; Jones, 2007; Gilbert, Balatti, Turner & Whitehouse, 2004; Borthwick & Wissler, 2003). There is also an emphasis on discovering ways to identify warning signs and to combat psychological factors, such as procrastination, which may influence their completion time (Kearns, Gardiner & Marshall, 2008; Ahern & Manathunga, 2004; Manathunga, 2002). Some researchers have even suggested a risk analysis approach to completions, by tightening selection processes as a way of improving completion rates (Manathunga, 2005a; Neumann, 2003).

Part of the selection process for PhD students, particularly those interested in a full time scholarship, is through the Honours research experience. In understanding undergraduate student research experience universities can minimise the risk of attrition in postgraduate research studies. They can also tap into the reasons why students continue on to research higher degrees, and improve the number of students moving into this increasingly important area. Shaw and Holbrook (2006) reported on a study of PhD examinations at eight institutions to investigate if Honours influenced the level of success in the PhD. The investigation involved the collection of candidate information for 100 students from each of eight institutions who had completed their candidature, as well as their written examination reports and examiner and committee recommendations

(Holbrook and Bourke, 2004; Holbrook, Bourke, Lovat & Dally, 2004a, 2004b). The candidate information included the highest degree level at entry into the PhD. Of the completed students 46% entered with an Honours degree (although it is not possible to ascertain the form of the degree). Another 27% entered with a coursework masters degree and 17% with a research masters degree. Although not the majority, by far the largest group of completing PhD candidates entered through the Honours route.

Of the Honours group, proportions differed between institutions (range 27% to 64%) and overall there were more females (53%) than males (47%). Those with Honours were also a significantly younger group than those with other PhD entry level qualifications and more of them were full-time candidates than other groups. In terms of equivalent full-time semesters enrolled, those in the Honours group also took slightly longer to complete.

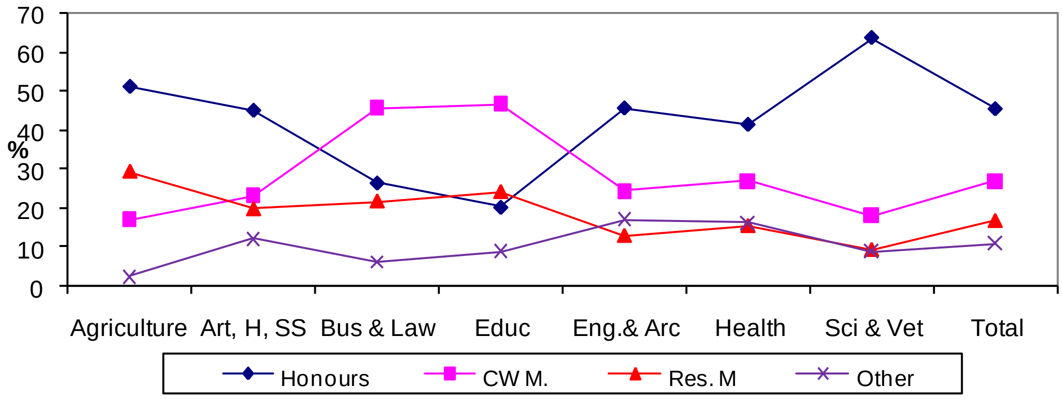

Figure 3: Distribution of entry degree by broad subject field for completed PhD students (N = 791)

When analysed by broad field of study (see Figure 3) it was found that there are differences between disciplines. The proportion of students in the Honours group ranges from 20% in Education to 63% in Science. Despite the fact that these data drew on a particular sample of completed PhD students and were restricted to a small number of broad classifications of fields of study, the disciplinary pattern is not dissimilar to that for total Honours enrolments (shown p21). The ‘Other’ category was comprised of recognition of professional standing and Bachelor degree entry.

When the results for PhD students who entered through Honours are compared to other candidates, the Honours group had a slightly better, but not significantly different outcome to the other candidates. Given the embedded belief within academe, and especially in the awarding of scholarships, that Honours is the most appropriate entry to the doctorate, these results raise questions about the role of Honours in predicting the success in doctoral research degrees in the Australian context.

Kiley et al (2008) also drew attention to some of the questions facing the future of Honours, particularly given the lack of evidence about the student experience.

> [Honours] is under threat by the increasing use of Masters as an entry and selection qualification for doctorates; by its unattractiveness to some students; by its lack of equivalence to overseas qualifications and lack of differentiation internationally from a Bachelors; by an ambiguity about what it stands for and produces. It could be reformed to address some of its limitations. But should it? (p.184)

What little is known about the role of Australian Honours indicates that its current role as research preparation needs further investigation. The quote above alludes to some of the issues currently being discussed, particularly the lack of visibility of Honours outside Australia, which raises concerns about equivalence and transferability of the qualification for students. In order to be more informed about the key outcomes of Honours for students, empirical evidence about the student experience within Honours programs is required. This can then begin to build an evidence base to inform how Honours prepares students for doctoral research study.

1.6 Significance of proposed research

The literature suggests there is a need for a stronger theoretical framework for understanding the needs of fourth-year students across disciplines to better identify and measure their satisfaction with coursework, research training and supervision, and the services they use. What is necessary if this is to be effective is to outline the student's own measures of quality and experience as a guide. It is this basic theoretical development that lies at the heart of the study reported here.

There is a need to examine in depth the research opportunities and outcomes offered to fourth-year undergraduate students across a range of traditional and profession-based disciplines. Further investigation in this area will contribute to the emergent literature on the role and purpose of Honours within Australian higher education. As found by Kiley et al (2009) in their recent study, there are many diverse programs within a university setting. The majority of studies about fourth year research have been confined to one program. In light of the wide range of Honours programs available, it was considered important to investigate a number of fourth-year programs to provide a basis for comparison of undergraduate research experience for students in different programs.

The first focus for the study was to: describe the program types and structures in one institution.

There have currently only been small-scale investigations into student experiences of Honours, mainly undertaken in a particular discipline area which will be further explored in Chapter Two (Hawes, 2000; Hawes & Flanagan, 2000; Fitzsimmons, Anderson, McKenzie & Chen, 2003; Todd, Bannister & Clegg, 2004). Australia has a relatively unique approach to research preparation through the undergraduate Honours pathway and, as such, it remains largely invisible in the global higher education landscape. Even those within the Australian higher education system find Honours difficult to describe, given that the programs have developed along with the massification of higher education and the growth of professional degrees. Recent studies have made progress in investigating the role and pathways of Honours programs across institutions (Kiley et al, 2008; Kiley et al, 2009), however, there is still little known about the student experience. What factors influence the experience of students conducting research in their fourth year? Does the experience differ across different types of program? There is a need to explore motivation and satisfaction with the fourth-year experience, and whether fourth year is a qualitatively different experience to earlier undergraduate experiences.

The second overarching focus of this study was: what was the student experience of fourth-year undergraduate students carrying out research projects?

In addition to the mapping of the fourth-year research programs which has recently been undertaken, there is a growing body of work on research education in Australia focused on doctoral students which has implications for undergraduate research students in terms of how students learn to be researchers (Manathunga, 2005b; Boud & Lee, 2005; Manathunga, Lant & Mellick, 2006; Manathunga, Lant & Mellick, 2007). It is important to understand how students experience initial phases of research, particularly in light of the importance placed on Honours as a predictor of success in doctoral studies and questions about the validity of the experience. There is a need to gain a deeper insight into the student experience of the steps and processes involved in the research project.

The third overarching focus of this study was: what were the highs and lows of the research journey for fourth-year undergraduate students?

The preparedness for research experience is closely tied to the thrust towards more support for research and better research quality, but the articulation between undergraduate and postgraduate degrees is largely unexplored.

The final overarching focus of this study was: how prepared were Honours students to continue on to further research studies?

1.7 Key definitions used in this study

Brief definitions are provided below of five key terms used in this thesis: ‘higher education’; ‘fourth year’; ‘Bachelor’; ‘research’; and ‘student’.

1.7.1 Higher Education

In international literature *higher education* mostly refers to all forms of post-secondary education. In Australia, the term *higher education* commonly refers to universities, whereas the term ‘tertiary education’ includes technical and further education as well (Beswick, 1987). In this study *higher education* will mean all study completed at university level.

1.7.2 Fourth year

Fourth year refers to the level of study a student is completing in an undergraduate degree. This applies to all disciplines. A student will only be eligible to participate in this study if they have successfully completed all requirements for previous levels of study. Fourth year will not include any studies completed through ELICOS or Foundation studies. It is realised that requirements for a *fourth-year* level of study differ across disciplines and that in some disciplines fourth year is also referred to as *Honours* year. An *Honours* year usually includes a research component. Honours in the Australian context will be defined further in Chapter Two.

1.7.3 Bachelor Degree

The Bachelor degree requires a minimum of three years of full-time study, with many awards requiring four or more years of study. A course leading to this qualification usually involves major studies in which significant literature is available. Course content is taken to a significant depth and progressively developed to a high level, which may provide a basis for further study.

1.7.4 Research

A project defined by systematic enquiry that may be discipline based or multi-disciplinary in focus.

1.7.5 Student

A student for the purposes of this study is someone who is enrolled in full-time or part-time study at a higher education institution.

1.8 Overview of dissertation structure

The ten chapters in this thesis are organised into five main areas: Introduction, Literature Review, Methodology, Presentation of Results and Discussion and Conclusions. This chapter introduces the thesis and some of the key terms used, and in particular highlights the background and significance of the study within the higher education arena. Chapter Two analyses the literature relevant to the study, and positions the study in relation to the field. A theoretical model is proposed to investigate research questions at the heart of the study. Chapter Three outlines the research methodology, and introduces the Journey Plot designed to measure aspects of a student's experience of research, and enable comparison across disciplines and programs. Chapters Four and Five present the analyses of the data from the document analysis and interviews with key faculty involved in fourth-year programs. Chapter Six gives an overview of the data from the Student questionnaire. Chapters Seven, Eight and Nine present results from the student questionnaires according to the type of fourth-year program in which a student was enrolled. The chapters look at End-on Honours programs, Integrated Honours programs and the Teacher Research Project respectively. Chapter Ten draws together the data from Chapters Seven to Nine, and then discusses the importance of the main findings and presents conclusions about the study, summarises the limitations and outlines avenues for future research.

2. THE RESEARCH EXPERIENCE IN FOURTH YEAR

2.1 Introduction

The first chapter set the scene for the more detailed discussion of the literature pertaining to undergraduate and postgraduate research that follows in this chapter. The initial section extends the discussion from the nature and structure of undergraduate research to the experience of the students. The second section draws on pertinent literature relating to the more thoroughly canvassed area of the doctorate. Doctoral experience and expectations have attracted sustained research since the 1990s. One particular element of the experience is captured in the phenomenon of the journey. Typically the journey is presented as a narrative and the focus frames the unique nature of individual experience, but the body of literature is beginning to indicate patterns in these stories that might translate to other contexts, not least undergraduate research project experience. The third section is devoted to the journey literature. At the end of the chapter the researcher presents a conceptual framework for an investigation of Honours programs built from the literature, attending to some of the gaps, particularly around skills preparation and motivation to do research at a postgraduate level, and also building toward the possibilities in the use of the journey to reflect on perceived readiness to go on to a research higher degree. Chapter Three then picks up the elaboration of the research questions and explication of design and methods

The following section will examine the scope and depth of the literature on student experience in research.

2.2 Student experience of undergraduate research

This section will explore the literature relating to student experience of undergraduate research. Firstly what is known about the needs and skills of new researchers will be examined, with themes emerging from the literature. The transition between undergraduate and postgraduate research requires students to develop new skills to become a researcher. There is research to suggest that a new researcher needs to be self-motivated to deal with the exponential increase in knowledge and to engage with the literature in their field; to be resilient in order to be equipped to overcome obstacles; and to feel a sense of belonging within their research environment by forming positive relationships with faculty and peers. Assessment of the product the research process, the thesis, will then be explored for clues at the end of the project which indicate whether a student is ready to continue to higher degree research study. This research is presented in the following sub-sections.

2.2.1 Measures of student experience in Australian universities

In examining the student experience of undergraduate research in Australia, there are a number of existing measures to draw upon. Over the past two decades there has been increasing interest in the experience of students in higher education. Since 1992 a survey has been carried out annually across all Australian universities, titled the Course Experience Questionnaire (CEQ). As described by McInnis, Griffin, James & Coates (2001) the CEQ is included alongside a Graduate Destinations Survey (GDS) as part of the national survey of all university graduates conducted by the Graduate Careers Council of Australia (GCCA). Using a 5-point Likert Scale response format, ranging from strongly agree to strongly disagree, it ascertains student perceptions of student support, learning resources, graduate qualities, learning community and their intellectual motivation for learning. Given that there is no distinction between Honours and other undergraduate students, and that the questions relating to further learning are generic, the material is not helpful in ascertaining anything specifically related to fourth-year research experiences.

There is another survey that focuses on the dimensions of the research experience for students; however, it is given only to postgraduate students. The lack of information about the growing number of postgraduate students in Australia led to the development of the new measure, called the Postgraduate Research Experience Questionnaire (PREQ). As described by Ainley (2001), the PREQ was developed using a similar Likert Scale response to the CEQ, ascertaining student perceptions of supervision, intellectual climate, skills development, infrastructure, thesis examination and the clarity of goals and expectations. It bears consideration that Honours programs should be more aligned with the PREQ, in terms of student experience with research. As it currently stands, within the vast undergraduate cohort, Honours students are invisible and no one asks questions about undergraduate research, so we do not know how much students feel connected to a research culture.

An instrument that explores the Australian Honours experience across a range of disciplines would prove valuable particularly when considering the quality of the research component of the Honours program, the impact of Honours on postgraduate student mobility and what skills and abilities Honours students carry with them to a postgraduate research degree or to the workforce. There is a lack of information about the research experience of students in their fourth year of study, which is most likely explained by the small proportion of these students who pursue higher research degrees (see Figure 2 in Chapter One) given that interest in research is highly specialised.

2.2.2 Student experience of undergraduate research in professional degrees

Increasingly professional disciplines are exploring how to integrate a research project, or Honours program, into their course curriculum so that students have an opportunity to experience research in practice. Predominantly the studies are evaluative in nature, carried out by academics interested in reviewing their own courses or with an interest in integrating research into their profession: Nursing (Kenny, Carter, Martin & Williams, 2004; Blenkinsop, 2003; McInerney & Robinson, 2001); Engineering and Computer Science (Inman, 2005; Fulcher & Piper, 2005; Robinson & Gosbell, 2003); and Archeology (Beck & Clarke, 2008; Beck & Balme, 2005).

Some of the literature, particularly in Geography (Schweinsberg & McManus, 2005; Pepper, Webster & Jenkins, 2001; Wadley, 1982) and Medicine (Power, White & Sefton, 2003), focus on advancing the debate about where Honours fits within their profession. In a number of disciplinary areas such as Psychology (Wilson & Provost, 2006) and Pharmacy (Ward, Dickson-Swift, James, Snow, Spark & Verrinder, 2008), there is discussion about the different models of research preparation which have been trialed to best prepare students for their professional field of practice. However, there is only moderate interest in the experience of fourth-year research students, and mainly to those who are working within the discipline or the profession.

In the professions often the concern is to highlight and establish the connection between theory and practice and the difficulties for researchers in practical settings. McInerney and Robinson (2001) identified the problems encountered by Nursing students in the course of their Honours research projects. The researchers analysed the reflective essays written by six different student researchers as they struggled to establish a legitimate space as Honours students within an acute hospital ward in a Tasmanian Nursing program in Australia. The study highlighted nurses' lack of familiarity with, or interest in, research and the difficulties associated with establishing new and innovative programs such as Honours in practical contexts. This suggests that, in addition to learning the skills to do research, nursing graduates imbued in a research culture may need to educate other members of the profession.

The involvement of stakeholders within the community is paramount in the professions when developing graduate outcomes. In response to rising concerns in Archeology that Honours graduates were not adequately 'prepared' for tasks required in practice, a benchmarking exercise was carried out in Australia modeled on the process developed in the UK. Beck & Clarke (2008) found that graduates were lacking in skills necessary to carry out their role, and employers were worried about the quality of research training given to students to enable them to be effective Archeologists. New benchmarks were developed through a collaborative process involving key academics, employers and students in the field. The process, funded by the Australian Centre for Teaching and Learning, is intended as one which can be modeled and followed by other fields.

2.2.3 Needs and skills of new research students

In the analysis of studies on undergraduate research two main areas emerged in the development of skills for new researchers - the importance of grasping the literature and formulating the ideas required for research within the field. Understanding of the literature is seen as the first step in the research process. Marfleet & Dille (2005) evaluated the use of informational literacy frameworks with an undergraduate research methods course in Political Science in the United States. They found that a student not only needs to be able to synthesis information, but to present a cohesive review of the literature in their area and to critically analyse the information. It is this process which enables the positioning of the thesis or research project and which demonstrates an understanding of the field, from which the research will be based.

Willison & O'Regan (2007), working in the Australian context, proposed a framework in order to help students in researching the levels of information literacy outlined by Marfleet & Dille (2005). They based their theory on a continuum of research skills and provided a scaffold of the levels involved to demonstrate mastery of information literacy skills. There were six major 'facets of inquiry' identified within the framework. These involved embarking on enquiry, using appropriate methodology, critical evaluation of information, organisation of information, synthesis and analysis of new knowledge, and communication of understandings and the processes used to generate them. The movement through the different facets of learning is not linear, but frequently recursive. Students may find, for example, that whilst synthesizing their data they need to go back and reframe their research questions. Furthermore they also identified five levels of student autonomy, demonstrating a movement from closed inquiry with a high level of guidance to open inquiry within self-determined guidelines and greater autonomy for the student.

Willison & O'Regan suggest that research at all inquiry levels require learning, from conducting a simple online search for references, to allowing research to be seen as 'very high professionally focused research' (p.398). This argument is similar to that of Brew (2006), who argues that research should begin at the commencement of the undergraduate program so that the development of skills can begin at an early stage, rather than leaving research until a student's final year when they perhaps enrol in an Honours year and suddenly begin to research.

In a more recent study, Willison, Peirce & Ricci (2009) reported on five consecutive cohorts in a first year Human Biology course and found that the explicit development of literature research skills at the beginning of the course facilitated the development of some of the skills required for complex, open-ended fieldwork later in their second semester. The study focused on all students within the regular course curriculum, rather than just students in a mentored research model such as Honours with high grade-point average entry requirement. This research raises the question of whether explicit instruction in research skills is an effective approach to increase success in fieldwork, particularly in the sciences.

Bruce (1994) found in a study of 41 beginning researchers that novice researchers have different levels of understanding about the literature and need significant shifts in understanding as they become more expert to conceive the literature as a tool to demonstrate their grasp of theory. This process is essential in situating the research problem within the field. Furthermore, Boote and Beile (2005) drew on studies with doctoral students to inform their understandings of the use of literature and proposed a framework where a student moves from general to expert interpretations of the literature. They also emphasised that 'a researcher cannot perform significant research without first understanding the literature in the field' (p.3).

Understanding the literature is a crucial step in the process of becoming a new researcher leading to the situating of the research problem within the field. Students need to be supported through this process in order to build their confidence in carrying out the tasks, and to show resilience in persevering with the challenges faced along the way. This is the focus of the next section.

2.2.4 Challenges experienced by new researchers

Overcoming challenges whilst engaged in research is another theme which emerged from the literature on the student experience in undergraduate research. The main concerns faced by students were the competing demands of coursework and research, time limitations and the isolating experience of research. In terms of research tasks, challenges were identified with the formulation of the research question and data collection stages of research. There were also a number of emotional considerations such as fear of failure and concerns about fitting in to the research culture of their discipline.

The experiences and perceptions of final-year social science undergraduate students enrolled in a final-year research thesis in an English university were investigated by Todd et al (2004). The study focused on the lived experiences of students, the support they received and how they utilised this support during the candidature. A questionnaire was sent to final-year undergraduate students enrolled in the course, and was completed by 44 respondents (47% response rate). All students who responded to the questionnaire were then invited to participate in semi-structured interviews. Fourteen students responded and were claimed to be representative of the student body at the time of research.

Todd et al (2004) investigated the highs and lows experienced by students whilst completing the thesis, which they explained as the ‘movement on the student’s part between emotionally unsettling experience of intellectual confusion and moments of insight and order’ (p.336). They termed these highs and lows ‘chaos’ and ‘cosmos’. These terms described the degree of uncertainty experienced by students as they crossed conceptual thresholds (Meyer & Land, 2003), which challenged their understandings of the learning process throughout the minor thesis and shifted the boundaries of their personal knowledge. They concluded that even with increased support, the change process of moving between chaos and cosmos is necessary for students to reach the required level of intellectual rigour for completing a thesis. The study also found that students needed to work independently and to form a sense of ownership of the research. Challenges faced occurred during the formulation of the research question and gathering information in the data collection phases. In addition, students experienced difficulties balancing the coursework demands with the completion of the thesis within conflicting time restraints.

Hawes & Flanagan (2000) surveyed 178 students and 27 Honours coordinators at Flinders University in Australia and found that the transition to Honours posed problems and students and Honours Coordinators had different perceptions about the nature of the problems. The undergraduate research year is a significant transitional stage for students in which they undergo not only changes in status from an undergraduate to a potential postgraduate student, but have to deal with increasing work demands. They are also expected to display independence, initiative, self discipline and scholarly potential (Hawes, 2000).

This mismatch of expectations was also found by Kiley, Moyes & Clayton (2009). Coordinators were interviewed across a range of disciplines from five different Australian universities. They believed that the major problems faced by students were time management and other commitments, whereas these were given a lower priority by the students. The students were concerned about feelings of isolation, stress, and fear of failure. The disparity in perspective suggests students may not receive support in the areas where they need it most and that they may, in fact, feel that they are cast adrift in the Honours year without a perception of direction or connection.

Zuber-Skerritt (1987) conducted a case study within the School of Modern Asian Studies at Griffith University. The study evolved from action research conducted by academics within the discipline, and involved six Honours and Masters students conducting one-year research projects. Similarities were drawn between problems such as isolation and loneliness experienced by Honours students and higher research-by-degree students. It was suggested that issues were accentuated for Honours students because of their greater inexperience in research and dissertation writing, and by the imposition of time limitations. It was argued that new researchers are in need of greater training in research methods and time management. It was found that holding workshops with groups of students and supervisors helped them share their fears and difficulties with peers and develop their confidence in these areas.

This finding was similar to that of Fitzsimmons et al (2003) in their smaller study designed to evaluate the use of a small group approach in supervising Honours students in Education. They implemented a model of supervision with four Honours students which provided high levels of support and encouragement from both supervisors and fellow students. The model was successful in terms of alleviating feelings of isolation experienced by the students.

These key studies highlight the obstacles students encounter during their research. The main issues identified were time, completion of tasks in relation to the research, and overcoming feelings of isolation whilst researching. An engagement with the learning community is seen as an important aspect for an undergraduate researcher.

2.2.5 Belonging to the Research Environment

The research suggests that researchers need a sense of belonging and acceptance within a faculty to assist them in making a smooth transition to the research environment. Lovitts (2005; 2001) contributes crucial knowledge through investigating the nature of the transition from an undergraduate student to an independent postgraduate researcher. She found in her large-scale, empirical study on doctoral attrition, based in the United States, that factors that contribute to degree completion include: the immediate setting in which the student works, the interactions that take place within that setting and the distribution of resources across graduates, particularly the availability of experienced supervisors. Robertson and Blacker (2006) found that undergraduates do not necessarily align themselves to the research 'community' and that, although some students have an early sense of proximity to and participation in a research community, for others it remains a remote phenomenon throughout their undergraduate years. However, it is acknowledged that their study which informed the findings was on a much smaller scale.

Reis-Jorge (2005) argued that undergraduate students develop knowledge and skills as researchers through their experience in carrying out research in his work on developing a conceptual framework for teachers' knowledge and skills as researchers. Waite and Davis (2006) build on this, and also the idea proposed by Zuber-Skeritt (1987), that the experience of research is enhanced through a collaborative research environment. They conducted a study in the United Kingdom using action research to introduce collaborative tutorials as another means of teaching undergraduate research skills in a faculty of education whilst improving motivation to be involved in research. This is especially important for women involved in research, as it appears women prefer working in groups that provide a sense of community and a collaborative approach (Conrad & Phillips, 1995).

2.2.6 Supervision of research students

There is some indication in the literature that individual interactions between a student and their undergraduate supervisor impact on both the experience of a student researcher and the pathways that they take to research higher degrees (Kiley & Austin, 2000). Moreover, the most important source of information about future postgraduate research study and choice of institution for students in Australia proved to be discussion between the student and their Honours supervisor. Students also preferred to seek advice from people directly rather than to seek information through media sources. This research suggests that it is crucial for a new research student to make individual connections with members within a School or Faculty and in particular with the advisor or supervisor for the project.

Supervision is an important aspect of an undergraduate research student's experience and having a good relationship with the supervisor/s is important both for new and experienced researchers. Pole, Spokkereef, Burgess & Lakin (1997) conducted in depth interviews with doctoral students and supervisors in nine universities in the UK in the disciplines of Physics, Mathematics and Engineering Science. They found that the early supervisor-student relationship may be crucial to the socialisation, and consequently the transition, of the research student.

Supervision is an area that has received a great deal of attention in the literature about research degrees (Todd, Smith & Bannister, 2006; Diezmann, 2005; Kiley & Mullins, 2005; Mackinnon, 2004; Conrad, 2003; Woolhouse, 2002; Anderson, 2002; Hammick & Acker, 1998), and in which a number of different models of supervision are emerging. Leder (1995) outlines factors which limit the traditional approach to supervision, such as an increase in research student numbers, time limitations involved in one-to-one supervision, and the perceived lack of reward for the extra workload involved in supervision. Latona & Browne (2001) also refer to the difficulties involved in the supervision model. Time is a limitation for supervisors identified in their study, along with neglect of other work, and supervisors who take credit for student work.

In the UK, Europe and Australia there has been an increase in supervisor training courses, which have become in some cases a mandatory requirement for supervisors. The rationale is that research students in the traditional 'transmissive' approach are simply 'filled up' with their supervisor's knowledge rather than taught how to be researchers (Grant, 2001; Yeatman, 1995). Some academics resent this intrusion into their 'private pedagogical space' (Manathunga, 2005b). Those supervisors who are used to the Apprentice Master Model (AMM) struggle with this new view of supervision pedagogy.

Manathunga (2005b) points to the resultant depiction of the transition from novice to expert researcher when viewed through this lens:

> There is a strong but unspoken tradition in postgraduate supervision that intelligent undergraduate students are able to transform themselves into independent researchers with minimal explicit pedagogical input from their supervisors. They are assumed to be…independent researchers with excellent critical, creative thinking and writing skills. (p.309)

There has been increased discussion about the notion of PhD supervision pedagogy (Brew & Pesata, 2004; Sinclair, 2005) and exploration of supervision practices (Manathunga & Goozee, 2007; Holmberg, 2006; Boud & Lee, 2005; Lee & Green, 2004; Johnson, Lee & Green, 2000; Lee & Williams, 1999). For example, Boud & Lee (2005) suggest that a pedagogical framework of co-production be used to view doctoral research. They use a constructivist understanding of the PhD to explain that supervision can be seen as peer learning, situated within a community of practice.

Students can be pointed in the right direction through 'guidebooks' which are based on research and the suggestions from experienced supervisors (Wisker, 2009; Denholm & Evans, 2007; Wisker, 2007). There is even a more 'tongue-in-cheek' interpretation of the role of the supervisor by Ahern & Manathunga (2004), who propose the role of the supervisor is to 'clutch start stalled students'. In successful cases, the supervisory process results in the production of a thesis by the student. Literature on the assessment of undergraduate research projects will be explored in the next section.

2.2.7 Predictors of success in undergraduate research projects

Assessment of the end-product of research is also a way of identifying expectations required for undergraduate research, and small group of researchers in the UK have been working in this area. A study based in Ireland explored tutor and student conceptions of an undergraduate research project in the life-sciences with respect to expectations about assessment (Tariq, Stefani, Butcher & Heylings, 1998; Stefani, Tariq, Heylings & Butcher, 1997). One finding that hinted at the confusion facing students given the range of views held by staff on the nature and purpose of the research project. Further to this study, Heylings & Tariq (2001) introduced a self-evaluation exercise to encourage students to reflect on their own learning and make judgements about their progress. Others have wondered about the effectiveness of assessment if the focus of assessment is primarily summative. Elton (2004) questioned whether classification of the Honours degree in the United Kingdom has a future. Of concern was the traditional attitude where assessment 'certifies the product of learning' (p.415). He proposed that a portfolio, similar to that used in art and architecture, be created to document student learning so that students are treated individually resulting in a more sophisticated sense of fairness, changing the emphasis from the end product to an on-going and integrated assessment and learning process.

Webster, Pepper & Jenkins (2000) conducted a study on one department in a UK institution analyzing the department's published criteria and how it was applied by markers on the assessment forms. The study found that there is ambiguity between academics even in how the definitions are used resulting in serious implications about the fairness of grades given. They argued that there is a need for explicit criteria and performance standards in assessment that clarify and make explicit what makes a first, second and a third class piece of work. A number of stakeholders are involved in the debate, not only including academics and universities themselves, but graduate employers and particularly the students for whom the dissertation is the single most substantial piece of work they will undertake at university.

Assessment of Honours research projects is yet to be addressed in the literature in the Australian context. There needs to be a clear focus on what the overarching aims of the research project are for the students and what predicts a successful outcome. Clear direction will assist in the transition for undergraduate students by making explicit the outcomes as they continue their journey in their chosen field.

Such aims have been documented in the UK through the national benchmarking exercise, however, the intent was to categorise the Honours outcomes at different levels in order to ascertain the brightest students, rather than to identify those with skills in research. As previously mentioned, the benchmarking process has been recently replicated in Australia in the area of archeology (Beck & Clarke, 2008), where all stakeholders became more aware of the purpose and outcome for each program.

In the area of science, factors were identified which predict whether undergraduate students would continue on to a research-based PhD in the United States. McGee & Keller (2007) investigated the intention of students to pursue research, an area unexplored in the literature. They used semi-structured interviews and a grounded theory approach with students who were participating in an undergraduate summer research program at the end of their candidature. Participants in the study were interviewed at the start, near the end, and then 8-12 months after their research experience. There was no indication given, however, of the number of respondents involved in the program.

They found five characteristics which predicted persistence into further research, namely: curiosity to discover the unknown, enjoyment of problem solving, a high level of independence, the desire to help others indirectly through research and a flexible, minimally-structured approach to the future. There was no evidence found of differences due to gender or race, however, web-based surveys used with a different group of students confirmed the high frequency of curiosity and/or problem solving as the primary reason students planned research careers in biomedical science, as opposed to clinical medicine. This study provides insights into the early experiences which motivate students to continue on to research.

Practice-based research in ‘real’ situations was found to increase student interest in research in an evaluative study of a research methods courses. Winn (1995) surveyed 37 social science undergraduates enrolled in an undergraduate research methods course. She found that students appreciated the ‘learning by doing’ approach to research and understood its value as a teaching method. The course also allowed links to industry, decreased the amount of time tutors needed to spend with one-to-one supervision of students and provided a positive transition to postgraduate research study. This is one of the key aspects of the fourth-year research project. Students who have successfully undertaken an Honours project have knowledge of the processes involved in research – they have dealt with the literature in their field, experienced the highs and lows and have established a sense of where they fit in the research community. If they have persevered with research, and intend to continue, they have also developed resilience to the challenges involved.

One of the key issues identified in the literature on undergraduate research student experience is the overcoming of obstacles or challenges they face, and the importance of belonging within the research environment. These aspects will be incorporated into this investigation about the experience of students involved in different types of research projects in their fourth year. However, there is still little knowledge gained from the literature about the milestones students are faced with in their undergraduate research experience, aside from understanding the use of literature within their field and how to formulate a research idea. Given the dearth of interest in student research experience which occurs before the postgraduate level, it is pertinent to review the broader literature about doctoral research for clues on how the undergraduate experience prepares students for research.

2.3 Doctoral Education

Though the literature in the area of doctoral education continues to expand rapidly in Australia, including large scale empirical studies, the latter are still relatively small in number and recent. Nationally competitive grants which have taken place recently include: the growth and diversity of doctoral education, the influence of metacognitive beliefs on success in the PhD, maximizing consistency in research on thesis examination and PhD assessment[2]. Current grants are investigating the

[2] The nature of these projects and project investigator information can be accessed through the Australian Research Council website http://www.arc.gov.au/ and the Australian Learning and Teaching Council website http://www.altc.edu.au/grants-and-projects

areas of: doctoral graduate publication, professional and community outcomes (Evans & Macauley, 2008-2010), industry research and innovation leaders (Manathunga, Boreham, Lant & Mellick, 2007-2010) and writing in the academy (Paltridge, 2008-2010). The breadth of the doctoral student experience has not yet been explored, and in particular an understanding of the milestones faced along the journey for different cohorts of students. Given the changes to the focus on research in the global arena, coupled with the increasing numbers of students undertaking doctorates, there has also been increased interest in the range of students interested in continuing on to doctoral education.

Research suggests that an increasing proportion of students in Australia are entering doctoral studies later in their career, often as part-time students with other work commitments (Neumann & Rodwell, 2009; Cumming & Ryland, 2004). About half of all doctoral candidates in Australia are part-time, yet there is a strong tendency for people to think and write about doctoral candidates as in their mid-twenties and studying full-time in a laboratory or library somewhere off-campus (Evans, 2007). Nevertheless, the recent enquiry into doctoral education in Australia stresses the need for students to engage in research whilst they are in their younger years, even suggesting the need to invest energy raising the profile of research in high schools (Bradley et al, 2008). But what is realistic preparation to participate in research?

Kamler & Thomson (2008) found that the 'advice genre' prescribes a structure of set linear rules to follow in order to complete doctoral research in a complete and ethical manner. They conducted content analysis on 25 of the most popular titles on doctoral thesis writing from a total of 4594 found at the Amazon website. However, they concluded that the guides fail to offer tangible strategies to address the complexities and anxieties experienced by doctoral researchers. Little is known about the intensity of the doctoral research experience, and what impact each of these set tasks has on the overall experience, or how students make the transition from undergraduate coursework to higher degree research.

2.3.1 What is known about transition to doctoral research

Literature which seeks to illuminate how students approach the change in student experience during the transition from undergraduate to postgraduate researcher, or more particularly from consumer to producer of knowledge, was a focus for this study. Recently there has been a thrust of interest in this transitional phase in the doctorate in the United States, particularly through the work of Lovitts (2001, 2005, 2008). Although there are differences in the Australian situation, given our undergraduate system of Honours research, there are some parallels as in many cases the doctoral thesis is the first time that American students engage in a research project within their degree program. There are different facets of transition which emerge through reading the literature: helping students to develop a strong connection with the learning community, the importance of the beginning of the candidature and giving students opportunities to experience authentic research.

The strength of the connection with the learning community is a key aspect to the transition of students involved in research. In her earlier work, Lovitts (2001; 2005) discusses disciplinary approaches to doctoral training and in particular the transition from coursework to candidature. The common outcome of doctoral training is cited as the production of a dissertation and the acceptance of the student into the community as a disciplinary professional or scholar at the end of a successful candidacy. In the United States, postgraduate research education can be divided into two stages, a dependent and an independent stage, over a five year time period. Students commonly undertake coursework for two years, to develop a deep knowledge of their discipline, and are then examined before they continue on to the independent research phase.

Lovitts (2001) explored doctoral student’s perception of their experience through the study of high attrition rates. She surveyed 816 completers and non-completers of doctoral studies, with particular interest in what caused students to discontinue their higher degree research. She concluded that the differences between ‘completers’ and ‘non-completers’ related to the level of integration and connection with the program, including socialisation and financial support. She also found that ‘the transition from course-taker (consumer of knowledge) to independent scholar (producer of knowledge) was hard for many students, and a significant number of students left their programs at this juncture’ (p.94).

Lovitts (2008) has very recently built on this research by further exploring the critical transition to independent research, given that academic staff found it difficult to predict which doctoral research students would successfully make the transition from course-taker to independent scholar based only on their undergraduate grades. She conducted focus groups with 55 academic faculty members across seven departments at two research intensive universities in the United States. The results of the focus group discussions indicated that six areas affected the transition for students: intelligence, knowledge, thinking styles, personality, motivation and environment. An important aspect of her study was the three different ‘fates’ experienced by doctoral students: distinguished completers, undistinguished completers and non-completers. Distinguished completers had an easy transition to independent research and produced a high-quality thesis. As Lovitts (2008) described:

> They are independent and practical in their approach to their research, are good problem solvers, and are bubbling with ideas. However, some may be somewhat lower in analytical intelligence and may not necessarily shine during the coursework phase of their graduate education…they display intense intellectual curiosity, are willing to work hard, take the initiative, and have the power to persevere in the face of apparent failure. They are motivated by a strong intrinsic interest in their research and are passionately committed to their projects. They also have good advisors and are willing and able to seek out and take advice from them. (p.320)

The extensive work by Lovitts (2001, 2005, 2008) in investigating student transition from coursework to doctoral studies in the United States suggests some important predictors of preparedness for doctoral research. Nonetheless, key questions were raised about how to better identify these aspects before a student starts their doctorate. Golde & Dore (2001), in their early work, interviewed students who had been accepted to doctoral research degrees in the United States and found that students who had previous experiences with undergraduate research exhibited more of a passion for research, already had a network of staff and students to access before starting their PhD, and demonstrated more accurate expectations and clearly defined goals for their research.

The experience of the PhD is not without difficulties and providing authentic research experiences for students to experience the highs and lows is seen to be one way to influence a successful start. Delamont & Aitkinson (2001), in their comparative study of British doctoral students in the fields of biochemistry and physical geography, found that the transition from undergraduate scientist to postgraduate researcher is accompanied by a 'sense of reality shock'. This comes because undergraduate laboratory experiments have been carefully chosen by supervisors and carried out under controlled conditions, so when they begin doctoral work they learn that 'real science is more complex, and failure is the normal outcome of routine work'. This can affect their progress in their doctoral candidature.

The beginning of the graduate research candidacy is viewed by some as crucial in the transition to doctoral study and the formulation of a solid research question can sustain a student for the entirety of their successful candidature. The development of research questions are a key feature of the thesis as they provide a map not only of the potential thesis but also for organisation of time and monitoring progress (Ingleby, 2007). The way research questions and topics are developed differs across different disciplines. Selecting the right topic is one of the major problems that graduate students mention. Lovitts (2008) linked this with creative intelligence, which she defined as 'the ability to formulate good problems and good ideas…it involves insight and imagination, and this is what the independent stage of doctoral education is all about' (p.304). The ability to find ideas and ask interesting questions was a powerful predictor, identified by academic staff, for students to make the transition to doctoral study with relative ease. Bowen & Rudenstein (1992) stated that many doctoral students spent one to two years looking for a research topic. They reported they did not have enough experiences with major research projects before initiating their doctoral thesis.

The importance of developing disciplinary identity during doctoral study has also been identified through studies in the United Kingdom (Parry & Hayden, 1994; Parry, Atkinson & Delamont, 1994; Delamont, Atkinson & Parry, 1997; 2000). Most recently Parry (2007) reported on a study which had two phases: the first phase drew on analysis of interviews of 120 staff and 120 PhD students, across a range of disciplines in three university settings. The second phase involved the analysis of 26 successful doctoral theses across different disciplines. The importance of doctoral students acquiring 'know-how' and confidence in a disciplinary area was identified as a facet of the successful completion of a doctoral thesis. It is on the basis of these disciplinary understandings that the different forms of the doctorate across specialised disciplines exist.

2.3.2 Disciplinary differences

It has been well established that within academic disciplines there are different dimensions which provide an analytical framework for exploring connections between the epistemological attributes of disciplines and the social aspects of the disciplinary communities (Becher, 1989). There have been a number of studies that investigated the differences in academic culture in university settings (Clark, 1987; Becher, 1989; Barnett, 1990; Becher & Trowler, 2001; Silver, 2003). Barnett (1990) described the idea of an academic culture as:

> …a shared set of meanings, beliefs, understandings and ideas; in short, a taken-for-granted way of life, in which there is a reasonably clear difference between those on the inside and those on the outside of the community. (p.97)

Studies on PhD student learning have observed significant differences between the disciplinary cultures of laboratory-based science disciplines and social science disciplines. There are several studies which have investigated the comparative experience of doctoral students in varying disciplines to determine which factors differ across these contexts. (Neumann, 2003; Deem & Brehony, 2000; Delamont, Aitkinson & Parry, 1997; Parry, Delamont & Aitkinson, 1994; Parry & Hayden, 1994; Whittle, 1992). A notable study in this regard is that of Deem & Brehony (2000) who conducted a study into the research culture of science and social science disciplines. They held interviews and focus groups with 38 doctoral research students at two different UK universities. Results of the study highlighted disciplinary differences in the choice of research topics, the nature of the supervisory practices, and the environment in which research is conducted.

In the science fields, the supervisor takes on a 'master' role, teaching the new research student not only the process of writing a thesis, but the laboratory-based experimental methods in carrying out the research. In many cases, the techniques used in this type of research are known only to the 'master' who passes on their knowledge to those 'apprentices' under their care. In a laboratory-based environment, new research students also have the support of the research assistants and postgraduate students, who are also part of research teams. These members take a role in familiarizing and supporting the new researcher in the laboratory. The research topic is normally derived from a funded team-based project. Students and supervisors meet frequently in the laboratory as well as in formal supervisory meetings (Deem & Brehony, 2000).

In the social science disciplines, however, research suggests that students may find it difficult to connect with their supervisor. Students choose their own topic which is not necessarily within their supervisor's main area of expertise and they are rarely attached to a research team. Students are regarded as more autonomous and often have less access to their supervisor, although this seems to be changing with the increased emphasis on supervisor training. In addition, students and their supervisors have different views of the research experience (Deem & Brehony, 2000).

Golde & Dore (2001) conducted a large-scale survey is the US on the experiences of doctoral students, involving 27 universities across 11 Arts and Science faculties. They collected 4114 surveys, with a 42% response rate. The data were analysed focusing on two disciplinary areas – English and Chemistry. The experience of doctoral students in the English faculties was solitary, relying on writing, reading and interpreting the human condition. In contrast, the experiences of doctoral students in Chemistry were team oriented, laboratory-based and were based on advances through experiment. They found that the nature of the discipline must be considered in analysing, understanding and seeking to improve doctoral education.

More recently, Golde & Walker (2006) investigated the future of the doctoral education in the United States with the Carnegie Foundation, investigating six disciplines in innovative university departments. They found that the student demographics, post-PhD career paths and how research and scholarship are conducted differ across disciplines. In particular what counts as knowledge, how knowledge claims are made and verified and even how the research within the disciplines is organised and funded, show that the ways students engage in research are embedded within the discipline. These windows into the culture of the field are called 'signature pedagogies' by Shulman (2005) which are described as 'the characteristic forms of teaching and learning…that organise the fundamental ways in which future practitioners are educated in their new profession' (p.52). Golde (2007) gives examples of signature pedagogies as the 'journal club' which is used in biological sciences and 'the list' which is utilized by English disciplines in the humanities.

This research suggests that discipline may also be a factor in the study of undergraduate researchers, and contributes knowledge about the nature of the experience. In particular it adds weight to the literature on undergraduate research, where students in the social science-based disciplines had less connection also with their supervisor and the research community. The work by Golde & Walker (2006) points to the differences in culture across disciplines, and how the way students conduct research is embedded in the signature pedagogies of the discipline.

2.3.3 Predictors of completion

The discipline in which a postgraduate student carries out their research has also been seen as a predictor of timely completion. Research from the United Kingdom suggests that a reliable predictor of success in postgraduate research studies is to be studying in a science-based field with a first or upper class of initial degree. Wright & Cochrane (2000) conducted a large-scale study of 3500 postgraduate students at the University of Birmingham, and found that science students with a first or upper second degree of Honours upon entering their doctorate were more likely to complete their degree within four years. These findings are also in line with data from the US (Bowen & Rudenstein, 1992) and Canada (Seagram, Gould & Pike, 1998) which found more able doctoral students studying within the science-based disciplines were more likely to complete on time.

Sinclair (2005) also reported on a large empirical study in Australia where a two-phase national survey of 5450 students and 1032 supervisors over the period of 1990-1997 was carried out across 26 universities. In addition, in-depth, face-to-face interviews were held with 83 supervisors and 26 PhD students across 17 universities. It was found that discipline influenced timely completion of the PhD, with candidates in the natural sciences being more likely to complete (75%) than social sciences (52%). The first year of study was found to be integral in the timely submission of the thesis, with timely, frequent and collaborative intervention recommended by the supervisor and others within the learning community.

Another Australian study, of 800 doctoral completions, also investigated completion time whilst taking into account part-time students by using a measure of full-time equivalent candidacy (Bourke, Holbrook & Lovat, 2006). They found the mean equivalent full-time semesters of candidacy was 7.9 semesters, ranging from 7.0 for Education to 8.4 for Engineering. In addition, in one Australian university, after allowing four years full-time equivalent, completion rates across all disciplines was 51%, after five years was 66% and after six years was 70%. For Science, Health and Engineering, completion rates after five years averaged

74%, while Education, Humanities and Social Sciences and Business averaged 47% (Bourke, Holbrook, Lovat & Farley, 2004). Engineering and Science candidates had a higher proportion of full-time enrolment (greater than 80%) than Education candidates (less than 50%), with a statistically significant difference in the proportions between Science (83%) and Arts (67%) candidates (Bourke, 2009) indicating that enrolment status may influence the ability to complete.

Manathunga (2005a) took a preventative approach to timely completion. Her study explored how experienced supervisors could detect and deal with early warning signs of difficulties experienced by doctoral students across a range of disciplines. She held a series of focus groups with 32 students and interviewed eight supervisors who had received awards for quality supervision practices. She identified warning signs which centered on four key types of student behavior: constantly changing topic or planned work, avoiding all forms of communication with the supervisor, isolating themselves from the School and peers, and not submitting work for review. A good strategy utilised by experienced supervisors, particularly in the Humanities and Social Sciences, was to provide increased access to the research culture for their students. She also found that experienced supervisors helped students to recognise that research involves problems, challenges and hurdles. As one supervisor commented:

> I tell them pretty early on, there are going to be highs and lows through the project…that's normal. (p.229)

Regardless of disciplinary differences, there is little research on the identification of these highs and lows experienced by doctoral research students. The next section explores the research experience from the student perspective, and whether these experiences can be compared across disciplines.

2.4 Research experience from the student perspective

The experience of doctoral research students has attracted some interest (Conrad, 2003; Holligan, 2005; Leonard, Becker & Coate, 2005; Kurtz-Costes, Helmke & Ulka-Steiner, 2006), however, very little research about being a research student is authored by students. Some students have felt a need to share their experience with others, having been through the isolating experience themselves with little to guide them, in an effort to share or document their journey for future doctoral students. There is also currently an emerging interest in 'just-now' reflection about the experience through blogging (Ward & West, 2008). Written recollections are few and far between, but collectively they make a contribution to the body of knowledge on the experience of research students and provide a framework on how to examine the issue. There are some noteworthy studies which illuminate the doctoral experience for those embarking on a PhD. These are examined in the next section.

2.4.1 The notion of 'journey'

Batchelor & Di Napoli (2006) write of their personal experiences of the doctorate in the context of an English university, likening their experiences to 'researchers as voyagers'. A similar notion of journeying was reported by Miller & Brimicombe (2003) who are also based in the United Kingdom. They define the journey as 'the act of moving from one place to another' p.408. They draw on their own doctoral journeys and also their work with a range of doctoral students across disciplines in one university where they provide research training in an interdisciplinary course. They extended the metaphor of the journey to conceptualise a mapping of the PhD process, which they have found through their personal experiences with doctoral students to traverse disciplines.

> Despite appearing very dissimilar, all cases have a commonality. They are establishing equivalence between entities or objects and the process of going or connecting from one to the other. Thus, beneath disciplinary contexts and nuances lies commonality of process. (p.408)

Through the mapping of the process they have found there are certain ‘signposts’ to guide students related to the formal stages of research such as the research proposal, or examination processes.

As mentioned previously, in the sense of learning to be a researcher, the journey is one of transition from dependent course-taker to independent researcher (Lovitts, 2001). Levins (1987) describes the notion of transition as ‘the movement from unknown to known’. This movement from unknown to known is also reflected in the work of Willison & O’Regan (2007) in their development of an information literacy framework for research, where the process of research is seen to be recursive. The transitional process is not always smooth sailing. The journey is described by Bradbury-Jones (2007) as ‘a journey only taken to reach a promise at the end’. The challenges implicit in the journey are explored through an analogy referring to a treacherous journey which can, in some situations, result in a story of personal failure.

Brause (2000) found that the experience of research is intense and there are strong emotions – positive and negative – involved in the process. The emotive aspects of the experience are reflected through the use of metaphor and representation, to try to explain the unknown experience using comparisons to everyday events which people can relate to. One of which is used by Kearns, Gardiner, Marshall & Banytis (2005) where the experience of completing a PhD is compared, through the use of highs and lows, to an emotional rollercoaster. The emotive experience, both in intensity and duration, is one pattern which emerges from the literature on the experience. The other pattern is that students self-identify their own milestones of the journey related to their individual experiences based on the intensity level of each experience.

2.4.2 Reflections about research

There are a number of narrative studies which provide a perspective of the doctoral experience from a single person perspective. Although these studies cannot be generalized to the total population they can provide keen insights into the research experience. The most consistent theme which emerged from the literature on the journeys was the description of the highs and lows which needed to be overcome. Trotter (2003), Meng (2004) and Dovon-Ope (2008) gave a summary of the challenges involved in completing a doctorate in Australia in the form of reflection on their personal experience. Similarly, the collection of reflections by individual students from Vilkinas (2005) also aimed to illuminate the doctoral journey. There were insights provided about the emotional journey, in particular, concerns such as doubt, guilt, loneliness and uncertainty were expressed by the research students. However, there was also positivity about overcoming the hurdles encountered along the research journey.

Holloway (2005) likened her experience to that of a ‘stranger in a strange land’. She talked of her transition from Honours to PhD:

> It was really the beginning of a journey, a journey on which I went down many rabbit holes, climbed mountains, jumped through invisible hoops, rode the emotional rollercoaster, and eventually decided to jump in with both feet. (p.31)

She went on to describe the literature review as one of the ‘rabbit holes’ and likened her growth of confidence to climbing a mountain. She captured the intensity of the experience:

> The peaks and troughs are sometimes close together and sometimes far apart…for me it was a bumpy ride initially, but gradually the peaks and troughs spread further apart and eventually evened out towards the end of the journey. (p.33)

The description Hollaway gave of her experience created a visual image of the emotional extremes experienced.

Neill (2005) drew on the metaphor of surfing:

> Completing a PhD is like surfing…you may be dumped and pummeled…fears and doubts will need to be faced and overcome. (p.22)

Perera (2005) started her PhD on a high describing ‘a blind adrenalin rush’, however, then described a low when ‘six months later…I realized I had unfortunately miscalculated my situation’ (p.27). Her low was also the literature review, where reading the research of others in the field filled her with self-doubt.

There is a commonality in negative and positive aspects of the journey and challenges encountered along the way by students conducting research. Nonetheless it is difficult to ascertain the sequence of the milestones experienced in a way that can be compared to other students or to measure the intensity of the emotions experienced along the journey.

2.4.3 Use of Metaphor and Representation

It is acknowledged that it is difficult to bring together all aspects of the research experience. Studies into examination of the doctorate and into doctoral attrition are making some progress to making doctoral pedagogy more explicit. In an effort to explain the complexity of the experience of researching, and make it more comparable to every day experiences, some have turned to visual representation and use of imagery.

A notable study in this regard invited a small sample of doctoral students from two Australian universities, at various stages of their research and across different disciplines, to write or draw their PhD experience as a metaphor (Styles & Radloff, 2000). The study then followed up with focus groups and interviews to more fully articulate the metaphors, and develop themes. Themes which emerged in order of frequency were: uncertainty, excitement, effort, menace, creation/progress and orderliness. Students in the early stages of their thesis were more likely to favour ‘uncertainty’ and those in their later stages to use ‘menace’ to encompass their experience. This was an interesting way of focusing the respondents on one key aspect of their experience.

Metaphors can also be used, however, to convey the complexity of the experience for students. A group of researchers at a conference on Ethnography in the US created a ‘Chutes and Ladders’ drawing to illustrate aspects of the doctoral process, locating the game on a hill to signify the uphill battle involved in completion (Figure 4). The metaphor is examined in Brause (2000):

> There are numerous ladders which represent the support from faculty advisors and peers. The chutes represent gate-keepers and distractions from life that side-tracked their progress. For those who persevere there is the oral defense then a time to celebrate. (p.12)

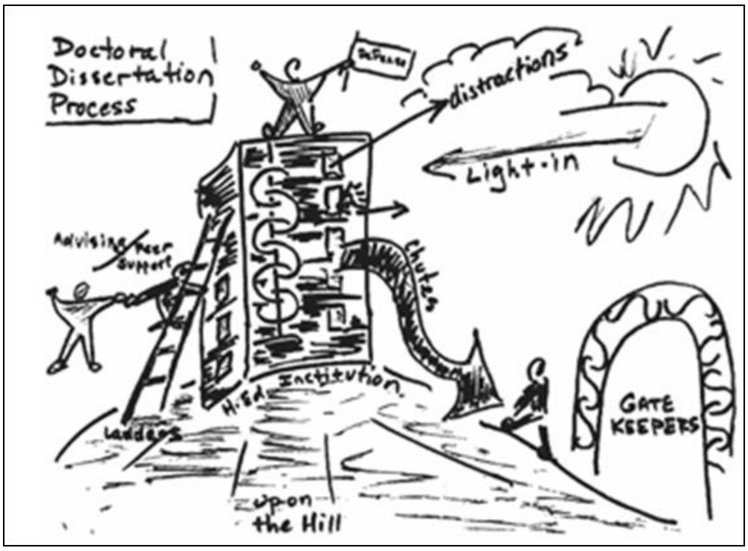

Figure 4: Chutes and Ladders

Australian researchers Kearns & Gardiner (2006) also used visual representation which made more evident the highs and lows experienced along the journey. Their focus was the emotional and psychological factors experienced by students involved in the PhD journey, through the visual image of a rollercoaster. The rollercoaster symbolised the emotional highs and lows of the candidature for ten doctoral students at Flinders University.

The visual representation is presented for each student, along with a summary of the interview data to add depth and illustrate aspects about the drawing. One of the journeys is reproduced below (Figure 5).

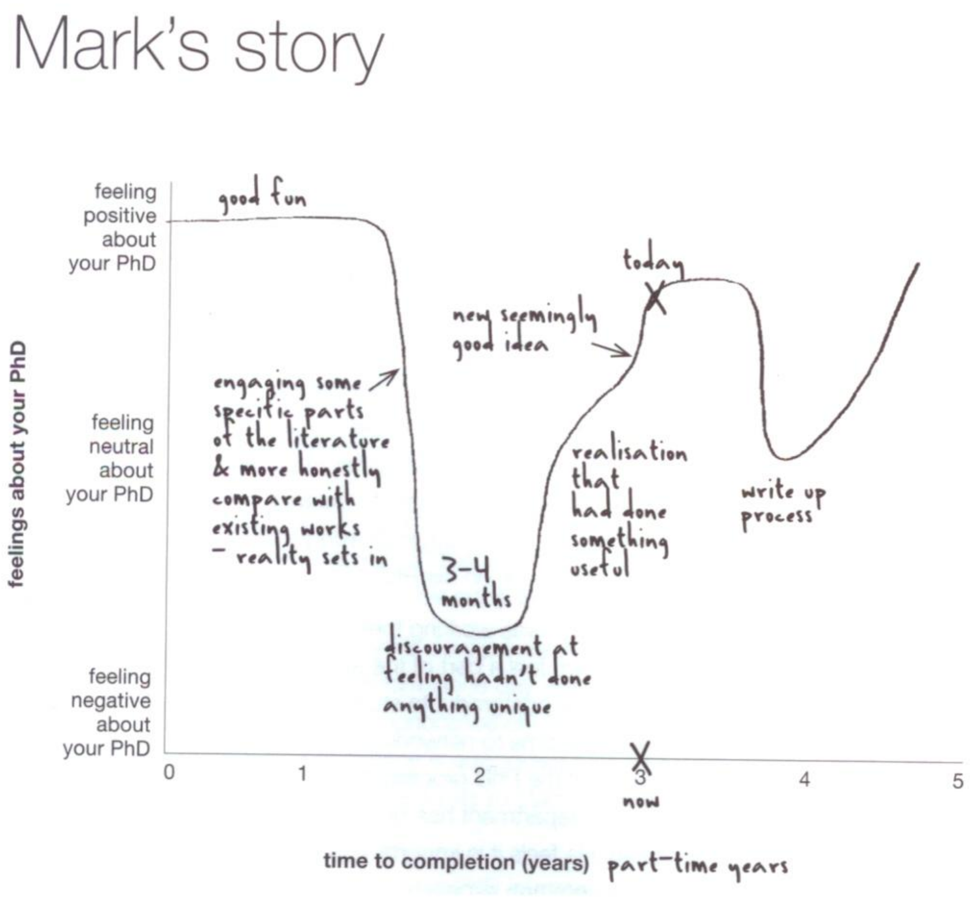

Figure 5: Mark's Story. Source: Kearns & Gardiner (2006).

Kearns & Gardiner (2006) use a form of visual representation which requires interpretation through follow-up interviews with the participant. In the visual representation showing Mark's story (Figure 5) the lowest depths of experience was articulated in strongly emotive tones and while it is difficult to determine with precision the intensity of the experience vis a vis other experiences, the sense of the episode is clear and similarly duration. For example, the low labeled 'discouragement at feeling hadn't done anything unique' appears to be considerably more negative than the 'good fun' he had at the start of the journey, and is situated somewhere in-between feeling neutral and feeling negative about his PhD.

Although Styles & Radloff (2000) trialled a method of comparing metaphors, and found that they could categorise the analogies, it could be argued that the drawings are open to interpretation. This is confirmed by the need to follow up with participants in the form of focus groups and interviews, or in the case of the representation described by Brause (2000), elucidation through discussions with the participants in a conference setting. This makes the use of visual representation as a method of investigating the research experience of students very time consuming and the comparison of experience across different contexts difficult. The use of visual representation, particularly the model used by Kearns & Gardiner (2006) of the journey is effective in mapping the highs and lows of the experience, but the format as it stands is not amenable to more specific identification of the relative differences in the 'ups and downs' of the journey as a whole.

Published accounts by students about their understandings of the PhD, and the translation of these into a journey narrative, provide insight into the doctoral research experience. In a practical sense the idea of visualising the journey is helpful because the reader can see the highs and lows which occur along the way. This was used by Kearns & Gardiner (2006) in their cognitive-behavioural work on self-sabotage and procrastination during the PhD (see also Kearns et al, 2005; Kearns et al, 2008). In turn the tool has been picked up by Graduate Offices of universities as a means to help postgraduate research students see where they need support in their research. The challenge for the researcher is how to delineate and more closely compare these journeys across a diverse range of contexts. Can quantification be used to capture such experience for example? There is a need for an in-depth approach in order to directly compare the experiences of research students.

2.5 Drawing together the theoretical underpinnings of the study

On the basis of the growing need to determine the scope and diversity of research practices within the higher education field, it is evident that there are still areas where further work is recommended, particularly in the Australian context where the Honours year is unique and plays a prominent role leading to research higher degrees. As noted by contemporary commentators, the time is now past when research was exclusively about developing knowledge within a discipline (Boud & Lee, 2009, p1) and programs such as Honours were accepted unquestioningly as part of a disciplinary tradition. The approach for this study sought to draw on both undergraduate and postgraduate literature on the student experience to gain the broadest possible perspective on the role and experience of Honours as research preparation.

In national course experience data, Honours is virtually invisible. The only national measure available for undergraduate students, the Course Experience Questionnaire, does not differentiate between coursework and research components in terms of the student experience. The Postgraduate Research Experience Questionnaire, designed to be administered to postgraduate students only, does attempt to identify some of these components and has been used to inform the study. In particular the scales relating to the research environment were relevant, such as resource support, the learning community and supervision.

There are few large-scale studies, with solid empirical research, that focus on undergraduate research projects in fourth-year. Notable exceptions are those by Todd et al (2004) and Hawes & Flanagan (2000). The remaining small number of studies on fourth-year student experience are limited in approach, mainly concerned with a small number of respondents in humanities-based disciplines, and furthermore carried out by the academic faculty working within these programs. Nevertheless, findings indicate that new research students face many obstacles, among them confidence in research tasks and coupled with the isolating experience of research.

Dimensions of the beginning research experience pointed out in the literature are, in the main, focused on the personal factors associated with the student and on the research environment in which the student is placed. A general model of motivation and learning proposes that certain personal characteristics (such as age and gender), prior knowledge and environmental factors help to shape how an individual approaches, engages in and responds to tasks. This, in turn, influences a student’s level of cognitive processing and outcomes such as choice, effort, persistence and achievement. This study predominantly takes a social-cognitive perspective, drawing on Bandura’s (1986) social cognitive model which identified an element called self efficacy, where individuals are viewed as both products and producers of their own environments.

The social-cognitive approach proposes that the learning environment is an important factor for a successful research candidature, as is the individual student’s cognitive approach to research. Self-efficacy beliefs help determine how much effort people will expend on an activity, how long they will persevere when confronting obstacles and how resilient they will be in the face of adverse situations. People with a strong sense of personal competence have greater intrinsic interest and deep engagement in activities, set themselves challenging goals and sustain their efforts in the face of failure. Moreover, they move quickly to recover their sense of efficacy after failures or set-backs and attribute failures to insufficient effort or deficient knowledge and skills that are able to be acquired (Pajeres, 2002). This is relevant to the way that successful research students overcome obstacles and challenges during their research.

The model assumes that relationships between components are reciprocal, for example, researchers have demonstrated how prior success and failure can influence level of engagement and motivation (Pintrich & Schunk, 2002). The student has an active role in learning and is more interested in courses which they have chosen. Further, their strategy use may vary depending on the nature of the tasks (Garcia Duncan & McKeachie, 2005). This is pertinent given that some fourth-year research programs are compulsory, whereas others require students to enrol after attaining the academic pre-requisites. We can theorise that students may have a different approach to learning in different scenarios, given the way fourth-year programs and enrolment are structured.

Researchers are increasingly interested in students' thoughts and beliefs during learning rather than their pre-existing skills and abilities (Schunk, 2003). There is an emerging area of research self efficacy in vocational theory. Forester, Kahn & Hesson-McInnes (2004) reported that research self efficacy has been found to predict graduate student interest in conducting research and their actual research involvement and productivity. It would be valuable, therefore, to explore aspects of research self efficacy in relation to undergraduate student research work, particularly in relation to how the undergraduate experience prepares students to continue on to higher research degrees.

Published studies indicate that the intention of undergraduate students to continue on a research path is also linked to relationships formed with academic staff (Mullins, 2006; Neumann, 2003; Kiley & Austin, 2000). The academic staff are important to the undergraduate student experience generally and, naturally, tend to have closer contact with the Honours students who continue on to postgraduate research study. The first phase of this study seeks to identify the range of outcomes for students across disciplines from the perspective of these academic staff and to explore whether predictors for success in a research project can be ascertained.

An overarching focus of this study is to bridge the gap in the literature about the nature of differently structured Honours programs, their perceived roles and how students experience research within these programs. Further, a new departure in this study, built from the doctoral literature, is how best to capture the dimensions of the research journey in a way that enables comparison within programs and between degrees. A visual tool is used to capture the pivotal points of the journey from the student point of view. In order to add detail and depth to what is known about the experience from the student perspective, the second phase of this study also focuses on student's perceptions of their learning approach, their self efficacy towards research tasks, and the way they interact with the research environment.

Over a decade ago Johnson & Broda (1996) highlighted the difficulties students faced when moving from undergraduate to postgraduate research programs. They reported few supporting structures, isolation, confusion and changes in relationships with staff. Since that time there has been little additional research conducted in the Australian context that addresses the transition for students, particularly in light of the new range of programs developing in professional fields. The need to investigate what prepares students to carry out higher degree research has gained impetus given the recent changes in higher education, both within Australia and globally. This study aims to elucidate elements of the undergraduate experience which prepare students for research higher degree studies, rather than seeking clues at the doctoral research level. The matrix below (Figure 6) poses a theoretical framework to examine the experience of students engaged in the process of becoming a researcher. It is anticipated that aspects of the multi-faceted approach, used in this study to add depth to what is known about how fourth-year students experience research, will coalesce in a holistic manner to explore the notion of 'research preparedness'.

	Learning Motivation *The learning approach towards Honours*	
Research Environment *The sense of belonging, including relationships, and use of resources*	**Research Preparedness**	**Research Orientation** *Research understandings and feelings towards research*
	Research Self Efficacy *A student's perceived ability to carry out research tasks*	

Figure 6: Research Preparedness Matrix

2.6 Summary

The role of Honours has received greater attention recently in the Australian context. There is an emphasis on increasing the recruitment of Honours students to boost postgraduate research student numbers and in turn to increase the numbers of research students able to enter academe. Yet there is a paucity of studies which come to grips with the undergraduate research experience from the student perspective. Those studies which explore the development of research skills point to differing experiences depending on discipline, particularly influencing levels of success and completion at a doctoral level.

One of the roles of Honours identified in a recent study (Kiley et al, 2009) was as a 'rounding off' to prepare students for professional practice. The notion of scholarly engagement within the profession is an area receiving increased attention, particularly in fields such as Health Sciences and Fine Arts. Student's experience in engaging in research, across different professional contexts, is an element which will further contribute to the field of knowledge. The other role Honours plays in Australian higher education is identified as preparation for research higher degree studies.

The research environment is identified as important to the transition for beginning researchers and a number of studies point to the importance of the learning community to alleviate the sense of isolation experienced. In addition, the way students approach research tasks differs depending on their approach to learning and their confidence in carrying out the tasks, particularly in the early stages of candidature when formulating the research proposal and positioning the study within the literature. The research journey is conceived as a way to encapsulate the experience from the perspective of the student, and to identify the highs and lows experienced by students in different programs. As Honours in the Australian context continues to be used as an entry requirement and a predictor of success in the doctorate, the notion that aspects of the experience can be coalesced to investigate research preparedness is also explored.

In summary, the review of the literature in Chapters One and Two has identified four areas of investigation worth pursuing in a single study. In Chapter One the lack of information about Honours in the Australian context, particularly at the time when the study was conceived, pointed to a need to both investigate the range of Honours programs available across disciplines and to identify the types of students engaged in these projects. In Chapter Two, a review of the studies on student experience in undergraduate research projects found that there is a paucity of studies which explore the intensity of the student experience, and situate it in the broader field of higher education and research pedagogy. An aim of this study is to seek insight into the student experience and to elucidate the research journey. Finally, this chapter identified a need to explore how prepared undergraduate research students perceive they are for further research studies. The questions addressing these areas are articulated fully at the beginning of the following chapter which then goes on to present the project methodology and approach.

3. METHODOLOGY

3.1 Introduction

In this chapter the focus of the study is first outlined through the presentation of the study aims and their associated specific research questions. The study has the overall aim of investigating the responses of fourth-year undergraduate students to the general experience of their Honours year and the specific experience of undertaking a research project.

Subsequent sections of the chapter provide an overview of the project design, a description of the site and detail the techniques used for the collection and analysis of the data.

3.2 The study aims and foci

The majority of studies about the experience of research of fourth-year undergraduates have been confined to one program, conducted by researchers based within that particular discipline. In the light of the wide range of Honours programs available, it was considered important for this study to investigate a variety of fourth-year programs with a research component. Therefore the first general aim of the study was to comprehensively explore the experience of fourth-year Honours students across a range of disciplines who were conducting undergraduate research projects. Given the current interest in increasing the numbers of students continuing to research higher degrees (Bradley et al, 2008; House of Representatives, 2008), the recruitment strategies used to inform undergraduate students about the research opportunities available within the discipline were also investigated. On this basis research questions were developed:

1. What range of opportunities exist at the institution level for fourth-year Honours students to undertake research?

2. What are the reasons for offering research programs in fourth year?

3. What faculty members believe are the key outcomes of the research programs for Honours students?

4. What recruitment methods are used to advise students about fourth-year Honours research opportunities?

There is also a lack of information about the undergraduate research students and, in particular, studies that compare the experience across different discipline areas. Therefore it was timely and pertinent in this study to explore the fourth-year cohort in greater depth. The demographic and educational characteristics of students were investigated within and between the range of fourth-year Honours programs, their perceptions of the program, and the characteristics of the programs themselves. The specific research questions follow.

5. Are there differences in student personal characteristics between programs? Characteristics considered: gender, age, financial support, nationality, previous qualifications, and whether a break in study.

6. Are there structural differences across programs? Program information considered: percentage of research in the program, research training provided, involvement in industry during the program, membership of a research group, research methodology used.

7. Are there differences across programs in environment measures and perceived quality of relationships? Relationships with: academic staff, administrative staff, peers.

8. Are there differences across programs in student motivation, self efficacy and intention to continue with research?

A small number of previous studies into Honours programs have used questionnaires, focus groups or interviews with students. The researchers had ease of access given that, predominantly, they were also supervisors of the cohort of students they were studying. The research tended to focus on factors involving the learning community, such as supervision and peer groups, or resources available to assist their research (Hawes & Flanagan, 2000; Fitzsimmons et al, 2003; Todd et al, 2004).

This study aimed to gain a deeper insight into student experience of the processes and steps involved in their research projects through asking how they felt about these. The notion of the research journey, an emerging area of interest particularly in relation to doctoral students, was explored. As outlined in the literature review, the journey of doctoral students is predominantly explored from a personal perspective. However, some researchers have used interviews with students or visual instruments to try to elucidate the experience.

Consequently this study used a visual instrument to obtain an overview of each student's journey. Depth and scope was added to the information obtained from the student journeys by using a mix of qualitative and quantitative data analysis techniques to compare the journeys across different programs in the institution. The aim was to arrive at a method to accurately describe the research project journey in a way that would permit comparisons of types of journey within and between programs. Specific questions follow.

9. What are the commonalities and differences across programs in the research journey for fourth-year Honours students undertaking a research project?

10. Can the different types of journeys that students experience within the same Honours program be identified and described?

11. How can the ‘highs’ and ’lows’ along the research journey be measured and compared within an Honours program?

Student perceptions of themselves and how they engage in the process of becoming a researcher contributes to the notion of research preparedness proposed in this study. The student and program characteristics and student perceptions of the Honours program and their personal journey were investigated to explore the concept of research preparedness.

12. What insights can we gain about the manner in which the fourth-year Honours research experience contributes to student research preparedness?

3.3 Project design

This study was designed to examine student experience of research in fourth-year undergraduate programs, across a range of disciplines, in one Australian university. Of wider interest was the notion of ‘research preparedness’, and whether there were aspects of an experience which contributed to a student being prepared to move on to a research higher degree.

The study drew on a mixed methods approach, with both qualitative (interview; documents) and quantitative (questionnaire) approaches being used to explore the complex issue at hand. The combining of qualitative and quantitative data as described by Mintzberg (1979) can be synergistic, using the systematic data to create a foundation for theory and the richness of qualitative data to build and explain the theory generated (p.597).

The mixed methodology of the study emerged from a ‘bottom up’ approach, developed from the pursuit of questions arising from the literature review. The method had its origin in the classic definition of mixed methods research of Greene, Caracelli, and Graham (1989), who defined mixed methods designs as ‘those that include at least one quantitative method (designed to collect numbers) and one qualitative method (designed to collect words)' (p. 256). The mixed methods study employed here draws on what has been identified by Creswell (2002) as a triangulation design. 'Triangulation is the process of corroborating evidence from different individuals, types of data or methods of data collection' (Creswell p.280). The process builds toward accuracy and neutralisation of bias (Anfara, Brown & Mangione, 2002) introduced by any particular source, individual or process of data collection, and contributes a more holistic approach to complex research problems through careful and systematic treatment of all the elements in the study to detect both convergence and divergence in emerging findings.

The practice of how research questions are used in mixed-method studies is discussed by Tashakkori & Cresswell (2007). In this study the approach is sequenced with greater emphasis on the quantitative element. The first phase (Questions 1-4) is qualitative and the second phase (Questions 5-10) is quantitative. The most pronounced aspect of integration in relation to both question and instrument design can be found in the exploration of the fourth-year research journey in Question 11, combining quantifiable points of comparison and open-ended responses requiring text analysis. The final research question then draws together the strands of the study to delve further into the student experience, investigating the notion of research preparedness which has previously been unexplored in the literature in relation to research.

Early in the study research questions and possible constructs were identified from existing literature. A preliminary mapping of the scope of fourth-year programs through investigation of institution websites showed that the greatest variation of programs occurred within institutions, rather than within discipline or subject areas. It was decided to concentrate on one site, and within the site to sample multiple programs. Given the single site used to study the phenomenon of student research experience and the case-based nature of the approach, the methodology drew on the case-study writing of Yin (1994). A population was defined from which the research sample would be drawn.

The case study was developed as a multiple-design case as recommended by Yin (1994). In the multiple-case studies design, there are no hard-and-fast rules about how many cases are required to satisfy the requirements of the replication strategy, which allows the researcher to probe beneath the surface of the situation. Yin suggests that six to ten cases, if the results turn out as predicted, are sufficient to 'provide compelling support for the initial set of propositions' (1994, p.46). Yin goes on to say that, since the multiple-case studies approach does not rely on the type of representative sampling logic used in survey research, 'the typical criteria regarding sample size are irrelevant' (p.50). Instead, sample size is determined by the number of cases required to reach the point where no significant new findings are revealed. The sample participants were selected openly to encompass instances in which the phenomena under study were likely to be found. The design was embedded with multiple units of analysis. Triangulation was also used through a combination of different techniques of collecting information, including both data and methodology triangulation, in the study to enhance validity and decrease possible bias as recommended by Denzin & Lincoln (2009) and Cresswell (2002).

The case study included two phases of data collection. The first phase involved document analysis which, for the purposes of this study, primarily involved the examination of documents to provide a 'scoping' of the types of fourth-year programs. The different types of programs found through the scoping exercise are shown in Table 2. This was combined with purposeful semi-structured interviews collected from key informants, which were conducted for the purpose of extending understanding of the options and opportunities available for fourth-year students to undertake research and the key outcomes for students. The second phase of data collection involved the investigation of the experience of students in the university in their fourth year, primarily using a questionnaire

It was anticipated that the entire cohort, regardless of the type of program they were completing, would be a difficult group to engage due to the intensive and transient nature of fourth year. On the one hand full-time End-on Honours students have one year to write their research thesis and in most cases they are at the same time completing coursework. On the other hand students in four-year professional degrees undertaking their fourth-year research project are also completing coursework and most have periods where they are involved in practical internships off campus. The ideal time to seek information about their experiences in fourth year was as close to the end of the projects as possible, however, the problem was anticipated that at this late stage students may be exhausted from the process of completing their project and perhaps unwilling to discuss their experience. It was decided therefore to design a questionnaire which could be disseminated directly to participants at some point during their project and to include an instrument to draw out more detailed information about their research journey.

Demographic information about participants and general information about the program were sought, and scales were developed to measure different aspects of the experience. In this format, the challenge was to elicit some rich information about their experience, in particular how positive and negative their experience was, and what aspects were viewed as positive by the participants. Participants were asked draw a visual representation of their journey, and then to label the highs and lows of their experience during their research project. A section was also included asking for open-ended comments about the experience.

To provide more in-depth data to enrich the findings from the questionnaire, focus groups were planned to follow-up the questionnaire information obtained. It was envisaged that focus groups would be held in two different disciplines, to compare the experiences of students in a four-year integrated undergraduate program against those completing a one year Honours program, and also to probe any areas of interest which emerged from the questionnaire analysis. However, owing to the low acceptance rate for the focus groups, this aspect of the study was not continued.

Table 2: Honours programs by Broad field of Education in 2005

Broad Field Of Education	End-on Honours Program [N]	Embedded Honours Program [N]
Health	B Nutrition (Honours) [2]	Nutrition & Dietetics [4]
	B Med Rad Sc (Honours) [2]	Physiotherapy [25]
		Occupational Therapy [9]
		Speech Pathology [20]
Management & Commerce	B Management (Honours) [3]	
	B Commerce (Honours) [1]	
	B Business (Honours) [9]	
Creative Arts	B Communications (Honours) [7]	
	B Music (Honours) [16]	
	B Illustration (Honours) [5]	
	B Design (Visual Communication) (Honours) [8]	
	B Fine Arts (Honours) [32]	
Engineering		Chemical [30]
		Civil [25]
		Electrical [74]
		Computer [30]
		Telecommunications [33]
		Mechanical [70]
		Software Engineering [25]
		Surveying [9]
Information Technology	B Computer Science (Honours) [4]	
	B Information Science (Honours) [6]	
	B Applied Info Technology (Honours) [2]	
Architecture & Building		Architecture [61]
		Building [40]
Society & Culture	B Arts (Honours) [31]	Psychology Honours [14]
	B Aboriginal Studies (Honours) [1]	Psychology Research Project [57]
	B Developmental Studies (Honours) [3]	
	B Economics (Honours) [4]	
	B Social Science (Honours) [10]	
Education		Teacher Research Project [326]
Natural & Physical Sciences	B Science (Honours) [28]	
	B Science (Biotech) (Honours) [20]	
	B Science (Forensic) (Honours) [5]	
	B Biomedical Science (Honours) [10]	
	B Science (Phototonics) (Honours) [3]	
	B Mathematics (Honours) [4]	
	B Science (Aviation) (Honours) [2]	
	B Medical Science (Honours) [1]	
	B Environmental Science (Honours) [8]	

*Numbers in brackets [ ] signify the number of students enrolled in program in 2005. Data were taken from internal statistical data available on website 8 December 2005

Dissemination of the questionnaire was a key consideration in this study to maximise response rates. The problem with this cohort, as mentioned above, was how to gather data at the end of their project, before they moved on to their next endeavour. The option of an electronic survey was canvassed, so that the questionnaire could be emailed to participants at the end of the academic year. The main problems with this option were the completion of the journey plot and capturing data from those students who, after finishing their project, would not check their emails. There was also, at the time of data collection, a substantial cost involved in developing the questionnaire into an electronic form which would allow data to be easily extracted in the formats required. Therefore a paper questionnaire was developed, with the preferred dissemination strategy being through the Coordinator of fourth year for the discipline. It was envisaged that these key staff members would have discipline-specific information about the best way to gather the data from their students.

Detailed information about the programs, and who coordinated these programs, was gathered through the investigation of the institution’s internet site. Coordinators were approached to be key informants for the study, to provide information to contribute to the first research question, about the structure, requirements and role of Honours or fourth-year research projects in the different disciplines. Data would be gathered for this part of the study through purposeful, semi-structured interviews, based on a brief protocol sent out prior to the interview. The face-to-face interviews situated and contextualised the case, providing preliminary case information and cross verification of the data collected through document analysis and questionnaires.

The next section will provide a description of the site under investigation. Subsequently each section of the methodology will then be outlined, beginning with the first phase comprising the Key Informant Interviews and the document analysis, and then the second phase, comprising the student questionnaire.

3.4 Description of the site

The site for the case study was a regional university. The site was chosen because of the large number of Honours courses offered in a variety of faculties, its high percentage of research students, its spread of students across demographic groups and relative ease of accessibility to the researcher who needed to spend considerable time with each of the disciplines.

As shown in Table 2, a large number of disciplines were offered at the university. Major areas included: Architecture, Building and Design; Arts and Social Studies; Economics and Commerce; Education; Engineering; Law; Medicine and Health Sciences; Music; Nursing; and Science and Mathematics. The sample for the study was stratified into two groups. The two groups were the one year End-on Bachelor's Honours group and the professional degree group with a research project integrated into their fourth year of study.

The university had a student population of approximately 20,000 at the time of data collection and the majority of students were Australian. A small proportion of the Australian students came from interstate, and international students came from a number of countries including: Singapore, Korea, Hong Kong, Taiwan, Malaysia, India, China, Norway, Sweden, USA, Kenya, Botswana, Papua New Guinea, Philippines and Indonesia.

Fourth-year programs were offered in nine of the twelve Broad Fields of Education (BFOE), as then classified by DEST. The majority of fourth-year programs were offered as an Honours year to be completed at the end of a three year degree, referred to by the university as an End-on Honours program. These End-on programs were predominantly located in the fields of Natural and Physical Sciences, Society & Culture, Management and Commerce, Information Technology and Arts. Professional degrees such as Education, Engineering and Construction Management, were offered as four-year programs, with the Honours year embedded in the program, or the inclusion of a research project with the Bachelor degree awarded with Honours. Although the number of programs using this mode was lower, there were more students enrolled due to the compulsory nature of the programs within the degree.

The first phase of the data collection conducted at the site described above will now be outlined.

3.5 Phase One data collection

The first part of this phase of the data collection involved becoming familiar with the site. To do this in the first instance, the researcher conducted a search of the institution's website, systematically searching through each Faculty and then School seeking information about End-on Honours programs and four-year undergraduate degrees which included a major research project. The types of information found were Faculty Handbooks, Course Outlines, Student Honours Handbooks and recruitment information. The second part of the phase involved conducting key informant interviews with the academic staff who coordinated these programs.

A database was designed to capture data from the university website at the time of data collection. The nature of websites is that they are constantly changing and, in particular, universities are in a period of flux where programs and faculties are constantly being restructured and reorganized. In the period of undertaking this study, the site underwent a major restructure of administrative processes and staff, resulting in a number of changes to where disciplines were placed within schools and faculties. Also affected were staff, who were taking redundancies and moving to other institutions, causing there to be a number of changes to the website and for website inaccuracies to occur. For this purpose, information was often checked with administrative staff in an on-going manner to ensure accuracy. Data collected at the time therefore are very valuable, as it would be difficult to access these data now without considerable time and effort.

The major aspects of interest that pertained to the structure of the fourth-year program, whether it be an End-on Honours program or a research project in fourth year. Information was gathered and entered in the database under the following categories: Name of program, Specific course name, Course code, School/Department, Faculty, Credit points, Duration, Assumed Knowledge, Contact hours, Research component, Research training, Teaching methods and Description of Course.

One issue that was evident in this data collection was visibility. In many cases it was difficult to find the Honours program information for a particular School or Faculty. There are often different screens created for undergraduate and postgraduate students, and Honours does not have a consistent place in this. It is officially identified as an undergraduate program, but in many cases actually shares more characteristics of a postgraduate program, particularly for the End-on Honours programs.

Information gathered in the database was used for cross-checking other data and for verification of program information, and as the basis for the selection of informants for interviews.

3.5.1 Key Informant Interviews

This section will outline aspects of the Key Informant Interviews including: participant selection and engagement, interview structure and process, recording and transcribing the interviews and data analysis.

3.5.1.1 Participant selection and engagement

Semi-structured interviews were undertaken with academic coordinators of Honours programs and fourth-year research project coordinators in the university outlined in the case study.

Coordinators were identified through the university website, which listed the coordinators in Faculties and Schools. Some Faculties were more visible than others, and in some instances contact was made with the Heads of School to request names of staff members coordinating Honours year programs or fourth-year research projects. Academic Coordinators were approached to participate in the study through a letter of participation which was emailed to all known coordinators, and in some cases to Heads of Schools and Faculties (Appendix 1).

Those Coordinators who agreed to participate in the study were then emailed or sent a copy of the Consent Form and Release Form (Appendix 2). The release form asked for the permission of respondents to have the transcript stored at SORTI, the research centre within the university to which the candidate belonged. If permission was not granted, transcripts were destroyed at the completion of the study as set out in the ethical considerations outlined in the section below. The list of participants and the forms were kept in a separate folder to the transcripts, and were destroyed at the completion of the study. The transcripts were identified only by the discipline of the program under discussion, for example, Chemistry. Any email addresses used to make contact with participants were also destroyed at the completion of the study. A copy of the email sent to participants in included (Appendix 3).

Participation in all sections of the study was voluntary. Participants were able to withdraw from the study at any stage is they wished. Names were not used in any aspect of the data gathering process ensuring that confidentiality was maintained. Where informants referred to specific names in the interview, these were not recorded in the transcripts. Every effort was made to give feedback to participants who indicated on their Consent Form that they would like a copy of any research arising from the study to be sent to them to the email address specified.

3.5.1.2 Interview structure and process

The interviews were semi-structured. Questions to be asked were outlined in the interview protocol that was sent to participants before the interview (Appendix 4). The order in which questions were asked was varied upon request by participants or according to the responses given by respondents, so that further information could be elicited if possible.

3.5.1.3 Recording and transcribing the interview

Data from the interviews were recorded using a digital voice recorder, and were then transferred to the computer using voice editing software. From this program, the electronic voice data was then transcribed by the researcher using word processing software.

The main purpose of the written transcription was to enable the researcher to undertake analysis, to show key informants the text to confirm their views were adequately rendered in the interview, and as an invitation if necessary to expand on what they had said.

A certain amount of editing of the written transcription was therefore desirable to give the general impression of the subjects' views, rather than a verbatim interview transcription which would not reflect the formal style of written text expected by academics. A transcription code was developed by the researcher as recommended by Kvale (1996) where interviews were not transcribed verbatim to avoid repetitions and parts that had little relevant information were condensed and summarized into parentheses. Pauses were described only by 'pause', or in the case of a significantly 'long pause' it was coded as such, as sociolinguistic analysis was not required. Interruptions to the interview were coded as //. Text from the recorded interview that might identify the key informant was changed, which was indicated in italics. For example, names of colleagues and titles used which may identify the informant. Interview data were then ready for analysis.

3.5.1.4 Data analysis

The data were analysed by developing codes for the transcribed interview data. The approach used was a mixture of data reduction and data complication, as described by Coffey & Aitkinson (1996). Data reduction is 'the addition of simple, broad analytic categories or codes … used to reduce the data to manageable proportions' (p.28). Firstly the data were simplified using a small number of codes which had been predetermined before coding, based on the literature and the constructs used in the questionnaire analysis, termed a 'start list' by Miles & Huberman (1994). The transcripts were then coded again to devise 'in vivo' codes from the language and words used by the key informants in the interviews. In this way a 'bottom up' approach was also employed to derive categories from the content of the information. As Coffey and Aitkinson (1996) explained 'the general analytic approach here is not to simplify the data but to open them up in order to interrogate them further…coding here is actually going beyond the data' (p.30). This simple approach allowed for different levels of complexity to be explored, whilst also allowing triangulation of other information collected to continue through the process.

Data were then coded or 'tagged' as described by Tesch (1990) by sorting text segments into relevant categories and analysed through the process of decontextualisation and recontextualisation. This was done by firstly allocating each interview transcript a text colour and then changing the text colour in that electronic file, so that the segment of text could be identified (A separate list was kept of associated colours for quick reference). The text segment was then cut and pasted to a new file containing all the data segments relating to that particular code or category. Categories were then retrieved, split into subcategories and linked together to make 'pathways' through the data. Data were then systematically explored for meaning, looking for patterns, themes, regularities as well as contrasts, paradoxes and irregularities, moving towards a generalization of the data. The data were then used to expand, transform and reconceptualise the information, opening it up for further interrogation.

Consideration was given to deciding whether to use a manual coding system or to use qualitative analysis software such as NVivo. Due to the small number of interviews, the interview transcripts and documents under analysis were analysed through a manual system. The researcher decided to opt not to use software and that this would also allow a more intense connection with the information. As analysis was continued as data collection progressed, the researcher made adjustments and probed further themes as they emerged. In addition, the process of manual analysis assisted in the interrogation of data without losing meaning, because the researcher was in control of the segmenting process.

The analysis during Phase One was ongoing and occurred concurrently with the second phase of data collection, as described in the next section.

3.6 Phase two of data collection

This section will outline aspects of the questionnaire including: the instrument; participant selection and engagement; and data analysis.

There is a paucity of literature in the area of Honours, and in particular literature which explores aspects of the student's experience of carrying out research in an undergraduate program. There has been no attempt to encapsulate a student's preparedness to conduct research, and as such this study is largely exploratory, building on a slowly growing field of research already conducted in this area.

3.6.1 Theoretical underpinnings of the questionnaire

The theoretical underpinnings of the questionnaire, as previously discussed in Chapter Two, are based on the general area of social-cognitive educational theory. The more specific areas investigated were learning motivation and research self efficacy. In addition the literature in the area of student research experience was drawn upon to explore how the research environment affected the student's experience of research and the orientation of each particular student to research experience. These areas are outlined below.

3.6.1.1 Learning Motivation

Motivation in this study is based on the work of Pintrich who uses a social-cognitive view of motivation and learning strategies, with the student playing an active role in learning and being in control of how motivated they are and which learning strategies they use. Pintrich developed the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich, Smith, Garcia & McKeachie, 1993) which consists of two sections: motivation and learning strategies. The motivation section assesses student's goals and value beliefs for a course, their beliefs about their skills to succeed in a course, and their anxiety about tests in the course. The learning strategies section contains items that assess the student's use of different cognitive and metacognitive strategies. The MSLQ is an 81-item instrument consisting of six motivational subscales and nine learning strategies scales. It has been adapted for a number of different purposes for use with researchers, students and instructors (Garcia Duncan & McKeachie, 2005). The instrument is designed to focus on a course, as opposed to it being a measure of general motivation.

In designing the framework for the model of research preparedness proposed for this study, it was important to recognise that students completing a course involving a major research project may have different motivations and learning strategies from those used in other undergraduate courses. This area is largely unexplored. The full MSLQ was too long for this study because it takes 30 minutes to administer and is only one component of interest. Therefore 13 items relevant to independent research work were adapted from the MSLQ for use in this study, from both the motivation section and the learning strategies section. These were organized into three sub-scales: Intrinsic Value, Self-Regulation and Cognitive Strategy Use (Pintrich & DeGroot, 1990), together making up the Learning Motivation scale in the study.

For the series of 13 statements, respondents were asked to indicate on a 6-point Likert response scale, their level of agreement with each statement from Strongly Agree (1) to Strongly Disagree (6). The MSLQ uses a 7-point Likert scale, but for consistency all scales in this study have a 6-point Likert scale with no neutral category. Such scales have been shown generally to have a higher reliability than the more common 5-point scales because the respondent is required to commit to either the positive or negative side of the scale (Bourke & Frampton, 1992, Anderson & Bourke, 2000, p.94).

3.6.1.2 Research Self Efficacy

Forester et al (2004) compared three instruments which measured research self efficacy in vocational education literature: the Self Efficacy in Research Measure (SERM); the Research Attitudes Measure (RAM) and the Research Self Efficacy Scale (RSES). All three scales have the promise as tools to measure research self efficacy of graduates and professionals in a variety of career fields, purporting to measure efficacy globally through a total score and to provide sub-scales for dimensions of research self efficacy. The study carried out by Forester et al (2004) concluded that the factor structure of the scores from these instruments should be focused on the items.

For this study, 20 items were selected from the instruments based on the phases of research that an undergraduate student would undertake across a range of disciplines. The items were then grouped into four stages of research tasks: conceptual, early tasks, implementation and presenting results. In the series of 20 statements, respondents were asked to indicate on a 6-point Likert scale the extent of their agreement as to whether each statement was true for them, from Strongly Agree (1) to Strongly Disagree (6), as in the learning motivation scales.

The Undergraduate Research Self Efficacy Scale for this study is designed to be used as a self-testing measure across disciplines, giving an indication of how confident students are in completing tasks related to their undergraduate research project. This is an indication of their effort, persistence and resilience in regard to research and whether they are ready to continue into postgraduate research studies. Also of interest is the Research Environment students experience during their research project, given the emphasis on this area in the literature.

3.6.1.3 Research Environment

National instruments used to measure student experience in undergraduate and postgraduate degrees were used as a guide for the Research Environment Scale for this study, in addition to literature exploring the student research experience (Johnston & Broda, 1996; Hawes & Flanagan, 2000; Lovitts, 2005). Items were chosen to represent the target field of interest, as described by Oppenheim (1992, pp.176-77) and recommended by Anderson & Bourke (2000, pp.29 & 112). They included access to resources, support given by university personnel, and the sense of belonging within the research environment. Eleven items were developed which contributed to two sub-scales: Learning Community and Research Support. For each sub-scale, the respondent is asked to indicate their responses on the same 6-point Likert scale as described above.

Another scale was developed in response to the evidence in the literature about the importance of belonging to the environment, and in particular the relationships students formed with people within the environment. The Quality of Relationships scale was developed, using a 6-point Likert scale, which indicated the extent of their interactions with peers, academic staff and administrative staff. Given the possible sensitivity involved with this scale, there was an additional option included for students to respond that they felt the question was 'not applicable'. The scale measured the degree of helpfulness and support given to the students by each of the groups identified.

3.6.1.4 Research Orientation

An instrument was developed in this study, building on the visualization of the journey (see Chapter Two) and also the work of Holbrook (1998) in quantifying highs and lows in projected futures and the density of ideas for teacher trainees and experienced teachers. Respondents were asked towards the end of their research project to plot their research journey on an axis, and self-identify the highs and lows of their journey. The plot of the research journey explored research understandings and feelings towards research. In addition, questionnaire items such as what factors contributed to choosing to do Honours and whether the respondent intended undertaking postgraduate studies all informed the area of research orientation.

3.6.2 A summary of the Student Questionnaire

Students were asked to complete the Student Questionnaire, which is a self-reporting instrument. The questionnaire took 15-20 minutes to complete. A copy is attached (Appendix 5).

The instrument was designed to gather fourth year student perceptions of their research experience during an undergraduate research project conducted in their fourth year or Honours year. The questionnaire consisted of a number of scales described.

The questionnaire consisted of six different sections as described below:

1) Part A

a) ***General respondent information***: gender, age, financial support, nationality, previous university study, and break in university study.

b) ***Information about fourth-year program***: degree, school, mode of teaching, enrolment status, and intention to undertake research higher degrees.

c) ***Information about research component of program***: research component of the fourth-year program expressed as a percentage; specific training methods; contact with industry/profession; working with a research group; level of involvement in choosing topic; frequency of contact with supervisor; facilities/resources required for research; level of resources provided by the university; level of supervisor expertise; gender of supervisor; and number of supervisors.

2) **PART B**

a) ***Learning Motivation Scales:***

i) Intrinsic Value
ii) Self Regulation
iii) Cognitive Strategy Use

b) ***Research Environment Scales:***

i) Learning Community
ii) Research Support

c) ***Project Methods:*** Experimental; Statistical; Interview; Philosophical; Quantitative; Survey/Questionnaire; Qualitative; Exhibition/installation; Observation; Fieldwork; Document Analysis; Focus Groups; Laboratory; Other.

3) **PART C**

a) ***Quality of Relationships***

i) Other students
ii) Faculty Members (lecturers and tutors)
iii) Administrative personnel (Offices)

4) PART D

a) Research Self Efficacy Scales

i) Conceptualisation
ii) Implementation
iii) Early Tasks
iv) Presenting the Results

5) PART E

***Research Journey Plot* –** plotting the highs and lows from the start of the research project to the point of submission of the project for examination. Labels on the highs and lows were coded to give more information about the milestones that students self-identified along the research journey.

A range of measures was developed based on the research journey plot including: student disposition at the beginning of the journey, the types of journey experienced, the milestones identified along the way and the extent of the highs and lows experienced.

6) PART F

Open-ended Comments – students were encouraged to write comments to describe any additional feelings they had about their experience of fourth year, the research project or whether they would go on to postgraduate research studies in the future:

3.6.4 An emerging measure: Research Preparedness Score

The relatively high correlations between the scales, together with the information from the journey, suggested the possibility that these measures could be combined to form a new construct. The literature review and interview data suggested that an appropriate name for the construct was Research Preparedness. Given that this was an emergent construct it will be more fully explained later (in Chapter Six, p199).

It was envisaged that how a student approached the research project, and their confidence in carrying out the research tasks, were associated to the preparedness of a student to continue with research. In addition, the 'positiveness' of the research journey would influence a student's orientation towards research as would a sense of belonging to the research environment. The availability of resources also played an important role in the beginning research experience. Also as indicated in the exploratory literature in the areas of Honours, it was suggested that students were influenced to continue on to further research based on their connection with academic faculty members (Mullins, 2004, 2006; Kiley & Austin, 2000). The student's own intention to continue on to further research was also an item included in the questionnaire to gain insight into whether fourth-year students were planning to continue with research studies.

A Research Preparedness Score was constructed by drawing together these aspects of the questionnaire. The twelve items which contributed to the score included:

- Learning Motivation Scales
- Research Self Efficacy Scales
- Research Environment Scales
- Intention Scale
- Quality of Relationships (Faculty) Scale
- Journey Plot Positivity Scale

3.6.5 Participant engagement and selection

The study was designed to concentrate on one site, and within the site to sample multiple programs. Programs were identified through investigation of the external internet site of the institution, and through phone interviews with administrative personnel to check data. Statistical information was obtained through the internal intra-net available to students and through contact with the administrative unit which generates the statistical data. All information gathered in this way was available to the public, and so did not require ethics approval. The programs that are eligible for participation in this study are outlined in Table 3, with corresponding data of student enrolments in the programs. The data did not differentiate between full-time and part-time students, but reflected the actual student numbers enrolled in the program or course gathered after the HECS cut-off date.

As outlined in the design of the study information to student participants was disseminated through the academic discipline or university faculty. In this way, the programs to be included in the study were dependent on the personnel. In some ways this was an advantage because for some disciplines high numbers of respondents were achieved through the approval of the staff involved in the program. Consequently allowances were made to disseminate the data in lectures or in seminars after the presentation of the fourth-year projects. However, a disadvantage of the design was that the engagement of student participants was dependent upon the engagement of staff, or more specifically the academic coordinators of the programs identified.

Academic coordinators were invited by letter to participate in the study, previously approved through the university ethics procedure (see Appendix 2 and 3). If the Coordinator did not respond to the email, a follow up email was sent and then phone checking with administrative personnel followed that to ensure that the Coordinator was not on leave or had been replaced by another staff member. In the email, Coordinators were asked how best to contact students in their area who were eligible to participate in the study. The researcher offered to attend a lecture or seminar if possible, to address the students about the aims and rationale for the study. It was anticipated that this would result in a higher response rate. The contact with students therefore was dependent on the method preferred by the School or Faculty. Reminders for participation in the questionnaire study were in the most part emailed to the Coordinators, unless they had nominated email addresses for questionnaires to be sent directly to students.

Fourteen coordinators responded to the request for participation in the study and data were collected from respondents in the specific programs or courses (see Table 3). The aim was to collect data as close to the end of the program/course as possible. This proved difficult, particularly in Education because there were limited opportunities to distribute questionnaires when the students were on their

Table 3: Dissemination of Questionnaires in Fourth Year Programs

Program/Course	BFOE	No. of Stud	No. of respond	Distribution	Response rate (% of program)	Response rate (% of sample)
Embedded Honours Programs						
Teacher Research Project	Education	326	165	September by Researcher at lecture	51%	56%
B. Speech Pathology	Health	20	17	November by Researcher at lecture	85%	6%
B. Construction Mngt	Architecture & Building	40	12	November by Coordinator	30%	4%
B Engineering (Chemical)	Engineering	30	29	November by Researcher at lecture	97%	10%
B Engineering (Civil)		25	16	November by Coordinator (2006)	64%	5%
End-on Honours Programs						
B. Science	Natural & Physical Sciences	28	17	November by Coordinator (except Physics)	61%	6%
B. Biomedical Science		10	5	November by Coordinator	50%	2%
B Science (Biotechnology)		20	10	November by Coordinator	50%	3%
B Science (Forensic)		5	5	November by Coordinator	100%	2%
B. Mathematics		4	3	November by Office	75%	1%
B. Design (Visual Communication)	Creative Arts	8	6	November by Coordinator	75%	2%
B. Communications		7	3	November by Coordinator	43%	1%
B. Music		11	0	November by email Follow-up email	0	0
B. Arts	Society & Culture	31	5	November by email and follow-up through email and Office	17%	2%
All Courses			293			

internship whilst completing data collection for their research project. The latest opportunity to meet with the Education students was at professional preparation lectures in September. There were separate lectures held for secondary and primary/early childhood students which the researcher attended. Lectures, however, were focused on the practicum experience and professional practice, rather than the research being conducted at schools for the project. In most cases Education students at this time of the year were at data collection stage of their project. All other data were collected at the end of the fourth-year projects in November.

The programs with the highest response rate were those which had an end-of-year requirement to present their research project or thesis. These included the Engineering, Science and Speech Pathology programs. This was an opportune time to collect the data as students were presenting their studies after submitting their thesis, so had experienced most of their journey. The researcher attended three of these presentations by invitation of the Coordinator, and had the opportunity to observe the seminars. This occurred with Chemical Engineering, Physics and Speech Pathology. The researcher wrote field notes for each of these experiences, which have been analysed along with the key informant interviews and document analysis when looking for themes and patterns in line with other data.

It was difficult, in particular, to collect information from Honours students enrolled in the Bachelor of Arts and Bachelor of Arts (Music) programs, and the response rates in these fields were very low. This may be because of the restructure of staff, meaning that some programs had experienced high staff turnover in one form or another. In addition, because these programs do not have presentations or vivas at the end of their Honours program, there was no forum for students to gather at the end of the project. This meant that the questionnaires were emailed to students, which was the method nominated by the School. There was unfortunately no other mechanism for contact such as meetings held or electronic contact through Blackboard, which was widely used in the undergraduate programs in the Faculty but not utilised for Honours at the time.

In an attempt to gather more information, the researcher contacted the Arts and Social Sciences disciplines the next year to try to access additional students for the study. A number of disciplines agreed to assist in accessing the students, and more questionnaires were disseminated through the School Office administrative personnel. However, only two additional questionnaires were received by the researcher. Given that they were collected in a different year and were not going to increase the response rate in a significant way, the two questionnaires were not included in the analyses. The data for this discipline were therefore from a smaller sample than for comparative disciplines, however, were still valuable to the study. Once collected, the questionnaires were analysed.

3.6.6 Data Analysis

Data from the questionnaire were entered into quantitative software program SPSS. The researcher used statistical analysis to examine the data. In particular, scales were developed.

In general, Parts 1 to 3 of the analyses outlined below were undertaken in an attempt to establish the existence of links between the background variables collected, the concepts measured by the questionnaire scales, and the measure of the research journey. Part 4 utilised both the student and coordinator data collected to add depth to the information about the programs and to aspects of the student experience. Parts 5-7 focused more specifically on the research journey,

1. Descriptive analysis of:

(a) General information about respondents
(b) Information about program and project methods
(c) Information about research component of program
(d) Intention to continue to postgraduate research studies
(e) Learning motivation
(f) Research environment and Quality of Relationships

(g) Research Self Efficacy

(h) Research Journey Plot

(i) Research Preparedness

2. Simple correlational analyses of the student and program data.

3. Analysis of variance between student and program data. Generally the independent variables were information about the respondents, such as gender and age, and information about the program, such as research group and supervision. The dependent variables were generally based on the scales, such as learning motivation, research self efficacy, research environment and quality of relationships.

Points on the journey plot were recorded in terms of the x and y coordinates. The start point and end point of the plot were recorded as were the time intervals delineated by the plot crossing the x-axis. Text was analysed indicating the events along the journey. The procedure used for transcribing data from the journey plot is explained more fully in Appendixes 7 and 8.

4. Text from open-ended questions and labels from the plot, which was transcribed and entered into word processing software for coding.

Once text was coded using qualitative processes, and points on the plot recorded in SPSS, journeys were analysed through parameters of the journey plot listed below to make comparisons between the research experiences for different students.

5. Analysis of the types of journeys.

The start point and the end point of each journey were coded as negative, neutral or positive. This allowed a comparison of the types of journeys, which is expanded upon Chapter Six.

6. Analysis of the intensity of events along the journey.

The intensity was measured by y-coordinate of each high or low. This is explained more fully in Chapter Six.

7. Analysis of the impact of events on different journeys.

The impact of an event on a journey was measured by calculating the area under the curve of the high or low. This is also explained more fully in Chapter Six.

3.7 Summary

In summary, the focus of this chapter was to detail the methodology used to explore the experience of fourth-year students carrying out undergraduate research projects. The data from the first phase, whilst not the main focus of the study, was important for giving context to programs within the institution which have previously been largely unexplored. Interviews with key staff involved in fourth-year research projects were designed to add another dimension to the study by probing the key outcomes of the research project across different discipline areas and to compare how student skills develop across the range of programs.

The second phase of the study then described the student experience related to their involvement in the programs. Aspects of the questionnaire administered included general information about the respondent, the program and about the research components of the project. A Research Preparedness Score was proposed which encapsulates the motivation, research self efficacy and research environment scales of the questionnaire, combined with measures to capture student intention to continue with their research studies and their disposition towards the research journey.

There were difficulties experienced in engaging participants for the study, however, this was somewhat alleviated by the mixed method design which allowed a triangulation of data and increased validity of the findings. An emergent area of interest was the methodology used to analyse aspects of the journey by transcribing, coding and recording text from the plot and measuring the coordinates of the visual representation. This method allowed for a depth of information about the research project previously not examined through a survey instrument, allowing for a comparison of student experience of research across different programs.

4. THE STRUCTURE AND RELEVANCE OF FOURTH-YEAR RESEARCH PROGRAMS

4.1 Introduction

This chapter will discuss the structure and relevance of fourth-year undergraduate research programs. It will provide a general overview of the first phase of the data gathered as described in Chapter Three, the document analysis and semi-structured in-depth interviews with coordinators of fourth-year programs across 19 disciplines in one Australian university. The analysis focuses on the meanings attached to Honours programs across the institution by the various Coordinators. The primary concern was the structure and role of the fourth-year undergraduate research program, encompassing the key outcomes of the experience for the students. Given the current emphasis on increasing the numbers of students continuing to research higher degrees and entering the academy (Bradley et al, 2008; Hugo, 2008), the recruitment strategies used to inform undergraduate students about research opportunities were also investigated.

This chapter addresses the following research questions:

1. What range of opportunities exist at the institution for fourth-year Honours students to undertake research?
2. How are the research programs in fourth-year structured and what are the primary reasons for offering Honours research projects?
4. What recruitment methods are used to notify students about fourth-year Honours research opportunities?

The findings are based on a ‘bottom up’ approach to analysis allowing for different levels of complexity to be explored and opening up the data for further interrogation (described in more detail in Chapter Three). This chapter aims to elucidate the reasons for offering a variety of fourth-year research programs from the perspective of the coordinators involved in developing and administering the research programs. The next chapter will then explore staff perceptions about the research experience for students within their discipline.

4.2 Types of fourth-year research programs

The types of fourth-year research programs examined within this study were wide-ranging. The general characteristics of each program or course were outlined on the university website, along with information such as pre-requisites, mode of delivery, proportion of coursework and research within the program, and assessment components. The name of a contact staff member was also collected from this source. For some of the programs there was information about research training components, such as a course on literature review or on research methodologies.

The types of research programs offered in fourth year were broadly divided into two categories: one year programs offered after graduation from a three year Bachelor degree (End-on programs) and research courses offered within the fourth year of a four year Bachelor degree program (Embedded Programs). In their recent two investigations of Honours programs in Australia, Kiley et al (2008; 2009) also found the same types of programs across a wider range of institutions. All programs offered at the cooperating institution are shown in Table 4, split into these two broad categories according to Faculty at the time of data collection.

There was a range of fourth-year undergraduate research programs offered across a number of Schools, including Health, Business, Arts, Engineering, Architecture & Building, Natural & Physical Sciences and Education. The characteristics of two types of programs in this study will be outlined in the next section.

Table 4: Fourth year programs offered by Type of Program (2005)

Discipline	End-on Honours Program	Embedded Program
Health	Nutrition	Nutrition & Dietetics
	Medicine (Radiation Science)	Physiotherapy
		Occupational Therapy
Business	Management	
	Commerce	
	Economics	
	Business	
	Information Science	
	Applied Info Technology	
Arts	Communications	Speech Pathology
	Music	Psychology
	Illustration	
	Design (Visual Communication)	
	Fine Arts	
	Arts	
	Social Science	
	Aboriginal Studies	
	Developmental Studies	
Engineering	Computer Science	Chemical
		Civil
		Electrical
		Computer
		Telecommunications
		Mechanical
		Software Engineering
		Surveying
Architecture & Building		Architecture
		Building
Natural & Physical Sciences	Science	
	Biotechnology	
	Forensic	
	Biomedical Science	
	Photo tonics	
	Mathematics	
	Aviation	
	Medical Science	
	Environmental Science	
Education		Teaching Teaching/PDHPE Teaching/ Music Teaching/ Design & Tech Teaching/ Fine Arts Teaching/ Science Teaching/ Arts Teaching/ Early Childhood Education

(Data collected from cooperating institution website current @ 8 December 2005.)

4.2.1 End-on fourth-year programs

Traditional one-year Honours programs in Australia follow a three-year undergraduate Bachelor degree. After graduating from the Honours degree, students are then able to continue to a two-year Masters and a three-year Doctoral program. In many Australian university disciplines the one-year Honours program is viewed as an essential building block in the process of becoming an independent researcher. Moreover, when following a research-focused career path, it is more usual for capable students to progress from Honours straight into a PhD program, fast-tracking their academic career preparation. For this reason a successful outcome in their Honours year is significant to these students, in terms of time and career trajectory.

In the End-on fourth-year programs listed, entry to the program is on the basis of academic performance in the three-year Bachelor degree previously awarded and is subject to the approval of the Head of the School. Students are required to apply for entry into the Honours program through the national University Admission process (UAC). Although it is an End-on degree, it is still classified as an undergraduate program. As such it is able to be deferred for payment by students through the Commonwealth-supported loans system and, in addition, students are able to apply for government financial help (Austudy) during their undergraduate studies. This makes the Honours year an affordable alternative to completing a coursework Masters for entry to the PhD program. The thesis is the basis for examination for one-year Honours programs and it is usually examined by a panel of academic staff including experts in the area from outside the student's institution. Depending on the program, there may also be coursework subjects included in the Honours year program (see Table 5). These subjects are usually designed to complement the research training for the project or to extend the grounding in the discipline through extra reading to assist in extending student thinking during the project.

4.2.2 Embedded fourth-year programs

There is a range of different entry requirements for the Embedded Honours programs within a four-year undergraduate degree, as shown in Table 4. They vary from being compulsory research projects which students must complete as a part of their four-year undergraduate course, to an ‘invitation only’ course where students are only able participate if they have achieved highly throughout the first three years of their degree. In the Embedded Honours fourth-year programs, which are predominantly based in professional disciplines, students are normally involved in a research project based on their profession or industry. This minor project is worth a proportion of their fourth-year work. Often one staff member co-ordinates the program for the whole of the fourth-year cohort and is responsible for administering the program. Students are allocated to a supervisor within the faculty or within the industry; however, it is not unusual for there to be co-supervisors for projects. In the Embedded programs, Honours is awarded on the basis of the merit for the whole program, not solely on the quality of the thesis (or major research project).

4.3 Program and respondent sample characteristics

As described in Chapter Three, invitations to participate in the first phase of the study were sent to key academic staff coordinating the programs outlined in Table 1. Of the 43 programs listed, 19 Coordinators agreed to participate in the study, i.e. a 44% response rate. Reasons given for not participating were loss of staff due to the restructure of the university and not having a cohort of students within the program. There were 12 (63%) interviews conducted with End-on Program Coordinators, and 7 (37%) interviews conducted with Embedded Program Coordinators.

As also outlined in the methodology section, the interviews were allocated a discipline-based code which is used throughout the presentation of results. This was to ensure that comments were not able to be directly attributed to a particular person or program within the site. In this section, any mention of the specific discipline or field has been removed from the comment and replaced with a discipline-based code shown in Table 2. The characteristics of respondent programs, based on the key informant interviews, are outlined. Programs were from the discipline areas of Science, Engineering, Arts, Education and Business.

Table 5: Characteristics of respondent programs

Discipline-Based Code	Type of Fourth Year Program	Credit Points allocated to research (Maximum 80CP*)	Additional requirements	External examination
Science 1	End-on	80CP		Yes
Science 2	End-on	80CP		Yes
Science 3	End-on	80CP		Yes
Science 4	End-on	40CP	40CP coursework	Yes
Engineering 1	Embedded	30 CP		
Engineering 2	Embedded	30 CP		
Engineering 3	Embedded	30 CP		
Engineering 4	Embedded	80 CP		Yes
Arts 1	End-on	40 CP	20CP method 20CP theory	Yes
Arts 2	End-on	80CP	Creative project	Yes
Arts 3	Embedded	20 CP		
Arts 4	End-on	80CP	Creative project	Yes
Arts 5	End-on	80CP		Yes
Arts 6	End-on	80CP		Yes
Arts 7	End-on	80CP	Creative project	
Arts 8	Embedded	20 CP		
Education 1	Embedded	10 CP		
Business 1	End-on	40CP	20CP method 20CP theory	Yes
Business 2	End-on	40CP	40CP method & theory	Yes

* 80Credit Points (CP) is a full time load for a year.

4.4 Disciplinary differences

There have been a number of studies that investigated the differences in academic culture in university settings (Clark, 1987; Becher, 1989; 1981; Barnett, 1990; Becher & Trowler, 2001; Silver, 2003). As previously mentioned, Barnett (1990) described the idea of an academic culture as:

> …as shared set of meanings, beliefs, understandings and ideas; in short, a taken-for-granted way of life, in which there is a reasonably clear difference between those on the inside and those on the outside of the community. (p.97)

The data from the interviews suggested that there were differences in what type of research environment was provided for undergraduate research students in order for them to 'fit' into the academic culture of the discipline. As the interview data were interrogated, differences in the academic communities from the Science, Humanities and Professional-based disciplines emerged. Some of these differences are outlined in this section.

4.4.1 Science-based disciplines

The End-on Honours programs represented in this section consisted of data from the Science-based disciplines. There were some clear influences on the research environment for this group which emerged from the data, namely: the strategic research topic; the competitive recruitment of Honours students; the specialized research training; and the support given by research groups.

4.4.1.1 Research topic

The choice of research topic in the Science disciplines was often strategic, as laboratory-based experiments are costly. Supervisors needed to carefully monitor the selection of research topics. One Coordinator pointed out:

I would offer a project, or a number of projects, and a student might choose amongst those. It is a really costly exercise in time and money and if a student wanders in and says 'I am really interested in doing this', I often don't have the money or the interest. [Science 2]

The expertise of the academic staff in the Science-based disciplines determined the types of projects students could undertake, meaning that students in these disciplines predominantly had supervisors with considerable knowledge in their research area.

The topic has to be limited by the research expertise of the academics in the discipline. Very, very rarely would you find that an Honours student comes along to do a project in which the supervisors have no real expertise. More often than not, what you will find is that the students are aware of what the academics' research areas are at the end of the previous year. [Science 1]

Research topics were also usually aligned with research grants. It was crucial to have good students who would at the very least complete a solid research project and this meant that recruitment was sometimes a highly competitive aspect of the Honours process within the Sciences.

4.4.1.2 Competitive recruitment

Honours students who can do a small but essential component of a larger research program are a valued asset in the Sciences, which often meant research academics were competing for potential students and aggressively marketing their research area.

> *…academics are hunting down potential Honours students. That involves, certainly from an academic point of view, advertising what your research interests are and trying to attract students who are in return also interested in the area in which you are working. [Science 1]*

In some cases students are also offered scholarships to attract the best and brightest candidates to their project. This sometimes caused allegiances to form within groups of academics in a discipline.

> *So there is an issue there where you have got a group who is offering money to an Honours student who is wavering… you can see some interesting dynamics. But I think we are all friendly and there is not too much ill will if one research group has some scholarships and another group doesn't. [Science 4]*

This added a different dynamic to the way Honours projects were offered to students particularly when some opposing academic staff found it hard to attract grant money for their research. It highlighted the particular value of the funding of Science, which enabled academic staff to offer Honours scholarships to train researchers within their specialism.

4.4.1.3 Research training

The more senior members of the research group generally took a supervisory role over the development of skills within the laboratory team, but other members of the research group were also expected to provide guidance for the Honours student. Delamont & Aitkinson (2001) found in their study of doctoral students in Science-based disciplines that the research group provided a collective mechanism of formal supervision and less formal enculturation. Where it was difficult for students to familiarise themselves with new equipment, processes and skills, particularly in the laboratory-based programs, the learning community helped to familiarise them with their research environment.

It is an essential part of the formulae that you have more senior people in the lab who have got a skill base and they help with the practical teaching of that skill base to the student. The Honours students belong to a larger group that has PhD students, Postdoctoral researchers and a couple of Research Assistants. The Honours students get guidance and interact with that cohort. [Science 2]

The academic staff did not actually get into the laboratory very often or have time to show new research students how to do routine things, particularly if they had a number of different projects they were supervising. However, they did meet on a frequent basis with their Honours students.

I will meet with them twice a week to discuss progress, their projects or troubleshoot…you know it is the guys in the lab that are really at the front row, imbibing them with the skills of how we operate in the lab. [Science 2]

The structure of the research group depended on the research area, and how many researchers were working in that area.

It depends on who the academic is, and how many students they have. If it is a relatively small group, maybe the supervisor and one Honours student or PhD student, then certainly it would be a very much closely one-on-one relationship. In the other larger groups you may find that there is a postdoctoral supervisor and some other senior PhD students, as well as your supervisor, helping you out. Again it depends very much on the area that you are working with and the group itself [Science 1]

In the Science-based disciplines the choice of topic, as discussed, was very strategic. It was linked with research funding, publications for the discipline and expertise within the research team. Although it was a competitive environment, there was a sense of teamwork within the discipline. Honours students were welcomed into a research team in the Sciences and taught many of the skills needed in the laboratory by postgraduate students and senior researchers.

4.4.2 Professional-based disciplines

The Professional-based Embedded fourth-year programs represented in this section included data from Engineering, Arts and Education disciplines. There were some clear differences in the structure of the research programs for this group which emerged from the data, they were mainly: the practice-based research topic, the balance between coursework and research project in a demanding final year, the contact with members of the industry or the profession and the facilities provided for research.

4.4.2.1 Research topic

In the professional-based disciplines, it was not just a question of the topic being strategic to the discipline, but also of value to the industry or profession to which the student would belong.

> *They are still able to use a wide range of topics and methodologies, but we have encouraged the students to tie the research project in with their actual teaching, reflecting on their practice and improving their practice, or various aspects of it. [Education 1]*

In many cases the research project was the first opportunity an undergraduate student would have to study a specialised area of interest, as many of the courses undertaken were more general in nature.

> *The final year research project is really individual work in collaboration with one of the academics, and what it means is that students are going to work on a project area that is of interest. [Engineering 1]*

As it was their final year, there were also a number of other courses students needed to complete. The next section discusses how students at times were consumed by their research project and consequently found it difficult to keep up with other coursework.

4.4.2.2 Balance between coursework and research

The Honours project was perceived as valued, but it was also acknowledged that there were many competing demands on students in their final year. This made the experience intense for both the Honours student and the Supervisor.

> *The Honours year is pretty tough year for the students who do the thesis for the first time. Doing a research thesis is quite substantial and they need to do some coursework, so that is a pretty intense year for the student and the supervisor. [Engineering 4]*

While the balance between coursework and completing a thesis in the fourth year of a professional program was demanding, as evidenced by the previous quote, being a part of a vibrant research community assisted in the transition and exchanging of ideas.

> *So it widens their horizons, instead of just doing coursework and examinations, people from their industry discuss things and are involved in the research project [Engineering 4]*

In most profession-based disciplines, this support and interaction with industry was of high importance because there was an expectation that after students had graduated they would interact in a similar way within the work place.

> *The research project is a working co-operation built around professional paradigms. You have got to come up to professional standards, because if you finish this Honours degree…you go and practice in the profession. [Arts 7]*

The contact with the industry or profession was given a strong emphasis in data about this group of students.

4.4.2.3 Contact with Industry or Profession

Industry employers and organisations were involved in the generation of Honours projects. In many cases research projects were real-life scenarios and were conceived by the disciplines as a way for Honours students to engage with their prospective profession and contribute to the community of practice. For some students this was their first experience in putting together all they had learned from the undergraduate curriculum and solving problems in practice.

> *They can invent something if they want or they can actually go and do a community based project where a client comes along. [Engineering 3]*

Some expertise was brought in from the industry when required, and these experts acted as an industry supervisor for the project.

> *Academics generate projects in line with our research areas. Usually we get industry people saying 'We would like a project run in this area', so that is another mechanism…Each student would nominally get an academic supervisor and if they are doing an industry project they will also get an industry supervisor [Engineering 2]*

Joint supervision between academic staff and members of the profession or industry was common in Embedded Honours programs. Supervision in this context was a shared responsibility – with the academic supervisor taking responsibility for the research process and the industry expert taking on the specialist knowledge in the field.

Experts in the field act as supervisors…They are usually very happy to talk about their specialty area…so my supervision in those areas that aren't my specialty is as a process supervisor. So I am making sure the deadlines are met and the timelines are met, and taking care of generic issues that would apply to any research. [Arts 3]

In some professional programs students were encouraged and assisted to complete research projects within their industry.

We encourage our students to do projects with outside organisations and outside experts, and outside professionals are happy to do that nominal supervision, saying they are the expert in that area and we aren't. They help the student but the university supervisors do all of the marking as we know what to expect in terms of the thesis. [Engineering 3]

Students through this model were being groomed to work within their profession, to use their research-based knowledge and the skills learned to improve the practice of their industry. The professional and industry-related networks made through this structure are explored later in this chapter. Needless to say, the learning community of these students involved not only the staff at the university and peers in their course, but also the industry which they had chosen to train to be a part of.

4.4.2.4 Research Environment

The research environment was not just about the learning community of academics and peers, but also about the facilities and support provided to students. Coordinators talked about the value of the Honours program to the Faculty and the facilities provided to engender a sense of belonging. Some disciplines tried to create a place where supervisors could meet informally with the students to provide on-going support.

We integrate some of the Honours students into our research group, so they join the research meetings, write papers with us and go to conferences. They join discussions with the postgraduate students, postdoctoral researchers and the academics. In this way they make better decisions if they want to go into research. It is quite exciting I think, a good opportunity for them [Engineering 3]

The facilities provided for Honours students in some Schools, particularly in Engineering, assisted the students to access the research environment of the discipline.

We have information sessions, we have an Honours room and we usually supervise them very closely. [Engineering 4]

4.4.3 Humanities-based disciplines

The Humanities-based End-on Honours programs represented in this section included the Arts and Business disciplines. There were some clear elements of the research environment for this group which emerged from the data, namely: the open-ended research topic, the fragmented learning community, inter-disciplinary research training and the lack of research grants and scholarships.

4.4.3.1 Research topic

Students were encouraged to explore open-ended research topics which related to an area of interest they had developed through their undergraduate study. Topics were determined predominantly by students in an area that they had an interest, and Coordinators of Honours programs tried to find supervisors to match. However, there were sometimes difficulties in matching supervisors to students given the range of topic areas within a discipline.

> *Students have an interest in a particular topic. However, our pool of supervisors that we are drawing on is becoming more problematic, given the diversity of thesis topics [Arts 6]*

Research topic was one of the clear differences in the start to the research journey for students in the Humanities, as opposed to Science-based research students.

> *I think that's a clear line between the Engineering and Hard Sciences and a lot of Social Sciences and Arts, where the topic seems to come from the student and not the supervisor. [Business 1]*

This freedom in determining the research topic also caused problems for students at the start of the research process, sometimes because the areas were broad and the Honours student had no experience in narrowing down a topic.

> *Students come up with a very specific idea in mind, but often you find that they haven't thought that much about attaching it to a particular theoretical platform [Arts 5]*

One of the main issues identified with the widely different areas of interest, was that it made it difficult to create opportunities for students to share with each other.

> *Informally and regularly we bring the students together to talk about any common problems they might have in doing their thesis. We rarely get the Honours students to get here which is partly I suspect a combination of poor communication from our end and partly that unless the topic is right on their thesis topic they don't feel compelled to come along. [Business 1]*

For some, the very nature of the discipline in the Social Sciences involved an isolated researcher working on a solitary topic.

But it is not very comparable to the Science situation, and one of the things I rather like about this discipline is that we are all too individualistic, and sometimes a couple of academics here work together, but mostly people are researching on very different things.[Arts 2]

Although opportunities were created for students to share common experiences, Honours students in the Humanities were often isolated with limited opportunities for connecting with other students. The experience was perceived to be lonely and limited in that they did not explore opportunities outside their immediate topic or within the broader learning community of the School.

4.4.3.2 Learning Community

One thing emphasised by respondents was the great variation in Honours topics and the difficulties in catering to all student's specific interests. There was also recognition that failure to do so did contribute to student's feelings of isolation. Seminar series were presented that encouraged the Honours students to continue to expand their critical thinking and expert understandings of the discipline.

Honours is usually run fortnightly, based on a two hour seminar, and ideally we have rotating guest lecturers coming in and speaking about different aspects of their expertise. The problem we have had with that in the past, is that the students are so varied in their interests that they often feel left out [Arts 5]

Nevertheless it was important to organise ways for the Honours students to meet so they felt part of the academic community. This was increasingly difficult as students engaged in part-time or full-time work to support their studies, making their access to the campus less frequent.

> *Definitely being together seems to help them because obviously the key thing, particularly with a few students who have to submit this year, is that sense of isolation. I have noticed, as the students are cramming in more and more work and more hours that they actually don't feel connected with the campus. There are very few Honours students I have had actually in the last five years who have been regularly hanging out with students at Honours level. I get the feeling that there is a bit of alienation. [Arts 5]*

When students commenced the Honours program they were perceived by staff to be more visible within the academic community, being invited to research forums within the discipline and becoming known to all the academic staff. Nonetheless the intention to include Honours students within research learning community did not necessarily mean that the students themselves felt part of these groups.

> *We make a particular effort with the Honours students to make them feel part of the School…as an undergraduate they are somewhat anonymous, but once they are Honours students they really become known by all staff and it changes the relationship between the student and the academic staff. We invite them…to our weekly staff research seminars, and there is an expectation there, but it drops off. [Business 2]*

A more formal way of creating a learning community was to create a compulsory research training course where students within the same School could meet to discuss approaches to the research. As discussed in the next section, this had its own challenges.

4.4.3.3 Research training

There were sometimes widely different disciplinary understandings within the Humanities and these were evident when they came together to learn about research methodologies. The diversity in interests within inter-disciplinary research methods courses in the Arts-based disciplines made it easier for Honours students to share with the learning community in some cases. However, there were still divisions between those from different disciplines.

> *There is some interaction although they do tend to sit in their discipline groups in the class. I have discovered that the three disciplines are at different stages of their own academic development in terms of their research methods. While it is not a problem, it is interesting for me because they are all at different stages in terms of research methods understandings. [Arts 6]*

The more formal research training was seen as a positive improvement on previous ad-hoc approaches.

> *There has been one change in the last few years that has become 'routinised' where research training is offered to the whole School. Organising basic training used to be a problem…so that has been one good change in the last couple of years. [Arts 5]*

Even so, it was acknowledged that the interactions still did not measure up to the image of the supportive research group within the Science laboratory.

> *It is the very diversity that makes the course exciting because each student has a lot to tell the others because their projects are so different, but it doesn't quite conform to the image of the closely integrated research group. [Arts 2]*

The differences in methodological approach for disciplines within the same School were not isolated to the Arts–based disciplines. The differences in qualitative and qualitative-based approaches were also highlighted in the general research methods course in Business. Interdisciplinary research methods training is of interest in the literature, particularly in the doctoral research area (Miller & Brimicombe, 2003; Manathunga, Lant & Mellick, 2007)

There is a very strong difference in those disciplines who use quantitative methods, and those who use qualitative. In that sense the skills and training that the students are getting can vary quite significantly…it is often a bit of a challenge to teach such a diverse group in the research methods course but we do try to give them a taste of both. [Business 1]

The differences in methodological approach resulted in some challenges for academic staff when trying to build the research training of the School as a whole.

4.4.3.4 Research Grants and Scholarships

There was a tendency for respondents in the Social Sciences to refer to differences between their situation and that of students in the natural sciences, which was not evident in the interviews of the Science-based or Profession-based disciplines. This comparative discussion was a strong theme in a number of the interviews, particularly in reference to research grants and whether it would be beneficial for students in the Humanities-based disciplines to be more involved in grants.

The availability of money was seen as a contentious issue. However, there was also the acknowledgement that research in the Arts did not have the same costs as research in the laboratory.

There is a big difference between the Arts/Humanities side and the Hard Sciences. It doesn't take a lot of money to do qualitative research, but if you have got to build a spectrometer or something for immunology, those machines cost a lot of money. You have got to have the big grants to keep the whole research process running. You can do research on the smell of an oily rag, and if it is a case study you can do it with the telephone basically, ethnography the same sort of thing, so there is not a requirement to get those big grants in. [Arts 6]

Indeed the research areas being investigated were seen to be tied to what was being funded through national grants. It was perceived by a few that some disciplines were ‘dying out’ because of the lack of funding and there were concerns about the effect on career academics feeding back into the discipline.

> *My impression at present is that scholarships are drying up, not only for the Humanities, but for the Faculty of Education and Arts. It is a shame. I don’t know what can be done about it, but I suspect the answer is not to be found within one university, but within the Australian university system. The kind of research that is done is usually solitarily in this area, although we do try and get projects up, and they are sometimes successful, but the type of research just doesn’t fall into any of the target areas for funding. And that slowly builds back, so that you don’t have enough postgraduate students with scholarships and you don’t have enough Honours students who really can look forward to spending full time on their projects, and dare I say it, you don’t have enough lecturers to teach the undergraduate students. [Arts 4]*

There was a sense that academics within a discipline needed to be taught to tie student scholarships within grant applications and projects, so that it was not just the process of research being funded but also an investment in training researchers who would then go on to do further research in that specialisation.

> *I don’t think in Business-related disciplines and even in the Social Sciences more generally, that we are very good at putting PhD scholarships into grant applications. There is a real art I think with having a PhD scholarship and a PhD project within a grant application, which is separate enough to stand alone as a thesis topic but is still part of the broader project that is getting funded. And I don’t know if that is something which is especially difficult in terms of grant writing and inherently easier in the hard sciences for example, or if it is just something that we haven’t learnt to do very well as yet. But unfortunately I think it is always better for a student to be funded through a larger research project because it means that the supervisors have got expertise and deep*

commitment to the substance of the project, and provides a better framework for the students to move. [Business 1]

There was certainly a strong feeling about research grants and changes were suggested to the way funding was approached within the Humanities. Also highlighted was the leadership role for Coordinators who in many instances would be driving these changes.

The role of the academic staff in engendering an appropriate research environment was central to a supportive research learning community. The main staff member driving the undergraduate research agenda was the Honours Coordinator in End-on Honours or the Coordinator of Research Projects in Embedded programs. This was a difficult position given that Honours falls between teaching and research, and Honours students are not recognised in an administrative sense as a part of the research student population. The role of the Coordinator was examined in the following section to explore the responsibilities of the role.

4.5 Role of Coordinator

The main role of Coordinators was to organise the Honours research program within their discipline, or in the case of Embedded programs to overview the organisation of the fourth-year research projects. They were involved in setting up the projects, appointing supervisors and were available to intercede if there were any problems. They oversaw the whole research process, from the conceptual stages until examination and organised external examiners if needed. Some of the Coordinators supervised projects themselves, particularly in the Embedded programs, where there were a larger number of students to be supervised. For industry-based programs, Coordinators also liaised with employers and managed projects if they involved members of the community.

Some Coordinators saw themselves as gate-keepers, to the research community but also to the profession. They believed their personal reputation rested with each graduate who undertook the Honours program.

> *I do not want anyone from industry ringing me on the phone and saying 'Who is this person you sent me? How come you have passed them on because they are an absolute waste of time'…I would never allow a student to get out of my range unless they were capable. [Arts 7]*

One Coordinator likened their role to that of a parent overseeing offspring, emphasising the importance placed on the development of each research student and on ensuring that students completed their research project on time and to the best of their ability.

> *I am the mother or father hen overlooking the whole process. Often times I scratch my head thinking 'perhaps I should be supervising this student'…but my job is really to make sure everybody gets through…to the best of their ability. That they get there on time. [Arts 6]*

As found in the literature (Lovitts, 2001; Hayes & Flanagan, 2000) support during the research process is beneficial to the process of completing a research thesis. The role of Coordinator is balanced between being an advisor to the student and ensuring their administration role is carried out. One of the Coordinators described the balance in approach needed to encourage independent thinking whilst also providing support.

> *My belief is that I will give you as much rope as you need, you build a noose or you build a ladder. If you build a ladder, you climb and you become; if you build a noose you hang yourself. Although I try not to let anyone hang themselves, my job is to rescue. But I don't rescue unless someone is prepared to think. [Arts 3]*

Coordinators saw themselves in a sense as protectors of the research discipline, and as the next section shows, it was important for there to be a learning community in which research flourished.

4.6 Recruitment

Recruitment is a crucial aspect of attracting students to continue on to Honours. It is an area which has not attracted research in undergraduate programs, and is particularly of interest to the End-on Honours disciplines where graduates from Bachelor degrees are sought to complete another year to achieve Honours. However, there has been a moderate interest in why Honours students choose to continue to research higher degrees (Mullins, 2006; 2004; Neumann, 2003) and investigation into the mobility of students across Australian institutions (Kiley & Austin, 2000). These studies suggest that the most important factor in recruitment is the individual academic staff members.

During the scoping part of this study, the researcher carried out a document analysis of the websites to uncover institutional information about the Honours programs. It was evident that many of the Honours programs were largely invisible, and this was also an experience of other researchers in the field when completing exploratory scoping of the programs on the internet (Kiley et al, 2008; Zeegers & Barron, 2008). Given that Honours on the institution's website was not visible, the recruitment of students at the time of data collection was wholly reliant on the method employed by the institution at the discipline, School and Faculty levels. The range of strategies that were used in different Schools is outlined in Table 6. The most popular strategies identified in interviews by respondents were holding an information session for Honours students, sending a formal letter and/or giving personal invitations to participate in Honours from academic staff members.

There were three different strategies used to recruit students for Honours programs: informal, formal or as a combination of both approaches (see Table 6).

In addition, Faculties on the whole used either a collective approach towards the task or focused more on the initiative of individual academic staff members.

Table 6: Recruitment Strategies for Honours Students by School

Recruitment Strategies	Engineering Built Envt	Speech Pathology	Arts & Social Sciences	Business	Communication & Design	Sciences
Formal Letter sent to select students	*		*	*	*	*
Information Session by School or Faculty	*	*	*	*	*	*
Review Academic Results during Bachelor degree				*	*	*
Academic Staff Personal Invitation	*	*	*		*	*
Coordinator attends 3rd yr lecture		*			*	
Word of mouth/Reputation			*			*
Honours Topics advertised in 3rd year	*					*

(Education is not included in the table because there was no information on recruitment of students other than that the research project was mandatory)

4.6.1 Formal approaches

Students were formally approached only on the basis of their academic progress. For example, the Coordinator of the Honours programs in the Business disciplines reviewed the transcripts of students. He did not have any preconceived idea of who would make a good Honours student, as he didn't often teach at the undergraduate level. Although this was a more impersonal method it was also perceived as more thorough as good candidates were not missed. In addition, the letter was seen as a way of congratulating students who had done well and acknowledging their effort:

We send a letter because we think that is a way of providing them with encouragement because we are essentially identifying them as high performing students so it gives us an opportunity to pat them on the back and say well done. [Business 2]

It was also a way of targeting students who might be interested in Honours earlier in their undergraduate degree. In some cases letters were combined with a seminar session to establish a connection by meeting the students face-to-face.

What we do is look at the transcripts of students in second year, and the really exceptional second year students we invite to an information session [Business 1]

Another way of formally recruiting students was to hold information sessions about Honours, generally offered to a group of students within a Faculty or a School.

They are not directly approached. This semester I organised an Honours information meeting and put up fliers to let students know it was on. [Arts 3]

In a number of Arts programs, Honours Coordinators attended third-year lectures to explain what Honours entailed. This was a method often combined with other approaches. The following Coordinator attended lectures to tell students about Honours, but also actively recruited through identifying outstanding students during assessment of their work in third year:

I went back to third year for Honours and did a couple of lectures and explained what Honours was, and actively recruited through that. I also sit as a senior lecturer on the third year assessment review panels, so I identify talent and then I send them all a letter. [Arts 7]

The use of the letter is used in an informal manner in this sense as it is sent only to those students identified through one assessment process. Other informal methods of recruitment of Honours students are outlined in the next section.

4.6.2 Informal approaches

Most of the informal ways of approaching potential students identified in the data were through academic staff members. These informal methods included an invitation to continue to Honours from an academic staff member and chatting informally to students in their early undergraduate years.

In one discipline the approach was explained at lectures and, in addition, lecturers identified students demonstrating a capacity for research. The Honours Coordinator then followed through with handouts and class visits.

> *I have got colleagues teaching in third year who prepare or put the thought into suitable people's head that they might think of a fourth year…I wander around third year classes and give a brief exposition about what we do in Honours and why it is good for them, and leave them a handout. [Arts 2]*

There was a general feeling from the respondents that they were not doing as much as they could to recruit Honours students, particularly in Arts. Some of the Coordinators from the Arts disciplines acknowledged the need to encourage more students to continue to Honours and that this was probably linked to their informal approach to recruitment. One Coordinator outlined their informal approach, and a need for a more formal process:

> *Sometimes we write to the students who have done fairly well, and I am going to make sure this happens from now on, because I think we need to have a regular process around this time of the year. [Arts 4]*

In fact some of the recruitment strategies were referred to as ‘haphazard’ and Coordinators acknowledged they were not actively seeking out the high achievers in their course in a systematic way. Their methods were predominantly based on personal approaches from academic staff, but due to the staff changes during the restructuring of staff at the university their Honours student numbers had declined.

> *I think we need to have a regular process around this time of the year saying it is obvious from your track record you have got distinctions or high distinctions in the key theory subjects… or say going through the subjects and getting the star performers. [Arts 6]*

Although using an informal approach, some Coordinators felt that those students who would be good at research would simply know and would make the effort to find out about Honours themselves. Other disciplines took a more collective approach to recruiting research students in their discipline.

4.6.3 Collective approaches

A number of faculties approached the task of identifying potential Honours students as a collective responsibility, as shown in the comment where colleagues put the idea of Honours into ‘suitable’ student’s heads. This notion is expanded in this section, acknowledging that staff within the discipline were best placed to identify a potential Honours student early in their degree program, and furthermore to direct them to make choices throughout their program which may lead them to Honours and beyond.

In some disciplines staff recruited in a more determined manner, where they would actively seek students to continue on to Honours and then into postgraduate higher research degrees as a part of a research grant. For example, in Science-based disciplines:

It depends on the personality of the academic… some prefer to advertise and see what comes along because then that means that there is someone who is really interested in the work that you are actually doing, whereas others are a bit more aggressive and actually try to sell the project to students. [Science 1]

The difficulty in recruiting potential students was identified in a comment by a Coordinator in an Arts discipline when discussing the importance of getting formalized strategies in place for recruiting Honours students. He explained that even candidates who were good potential Honours students would not always self-identify as such until approached.

…what has surprised me is that some of the better students who consistently get High Distinctions often they don't even contemplate (Honours) themselves…obvious candidates don't seem that obvious to themselves. [Arts 5]

This statement highlights the level of mystery surrounding recruitment of research students and also ignorance of the possibilities in research from the student perspective.

4.7 Research grants

Coordinators from all programs were asked about the opportunities for their students to be involved in research grants and this subject called forth a diverse range of responses. Some talked passionately about the opportunities available to their students because of the research grants they had won, whilst others were more cynical given that their discipline area found it very difficult to attain research grants to boost their funding.

Coordinators were asked whether staff in their disciplines were involved in projects arising from research grants, and furthermore whether opportunities were given for students to participate in research grant projects. It was clear from the interviews that all disciplines felt it would be beneficial for their students to be involved in such projects. However, what became apparent was that some disciplines found it difficult to get grant funding in their areas of research.

This situation created a divide where some disciplines rarely obtained funding for undergraduate or postgraduate students, whereas research intensive disciplines had the money to entice not only postgraduate students but increasingly Honours students as well. Honours scholarships at the time of data collection were available only in a few of the Science and Engineering disciplines which were research intensive, with a culture of research grants. A number of the Coordinators in the Science-based disciplines emphasised the importance of gaining grant money to carry out research in their discipline:

> *There are Honours scholarships available and they are normally between $2000-4000. They come from research grants, ARC funding or whatever research funding is accessible within our industry. The only way we can carry on our research is to have external funding. [Science 4]*

In the Science disciplines, selection of topic area for Honours was often the first move towards a specialised career path. Attracting good Honours students means that you were able to train researchers who would become fellow colleagues, making the need to recruit capable students more of a necessity. The changes in funding for Honours students in one discipline arose from providing incentives to attract the best students:

> *Just nowadays many of my colleagues are offering scholarships for Honours students, about a $5000 scholarship for the year, so that is quite reasonable and that is a good incentive for them to actually continue doing Honours in that particular area. [Science 1]*

On occasion there was rivalry within the same discipline for Honours students, depending on which groups of academics had won research grants in that year.

Competition between groups of researchers to attract Honours students in their research specialisation had also resulted in the establishment of Honours scholarships within the discipline.

> *When we are offering the research projects, it depends on the research group and how much money they have. When I first came here there was no such thing…one particular person decided that they would try and get a bit of competition, offer some money, that of course meant that the other research groups then had to compete a little bit. So it has gradually grown to the point where most of them now are offering some scholarship money. [Science 4]*

Involvement in grants differed according to the particular discipline. In some Engineering disciplines, grants were also seen as a necessity.

> *Most of our research involves expensive projects. None of the students would have been able to do their research projects as most of the funding is actually coming from our research grants, We would have to shut them down as we don't get anything from the university to do Honours research projects. [Engineering 1]*

Although in the Science and Engineering disciplines research grants were seen as part of the norm, particularly in those areas such as Chemistry where expensive projects needed to be funded, other disciplines saw research grants as problematic. Involving students in this research grant in an Arts-based discipline was seen as an issue of ethics and the Coordinator was worried about their involvement being perceived as favouritism.

I have two students who I will be employing. I have some grant money available and they are planning on doing their Honours theses on related topics. Their work will include analysing some of my data and I don't like the idea of student slave labour. In a sense getting paid to do the data analysis for their Honours is an advantage. I find the ethics of that quite tricky and it is the first time I have had to face that. [Arts 3]

Summer scholarships also created some tensions in ensuring fair and equitable treatment of all students. They were sometimes offered at the end of a student's third year of study, mainly in those research intensive disciplines with a number of research grants. The administration of scholarships was approached in different ways. Some Coordinators felt that it was good for students to get the experience of research and get a 'jump start' into their fourth-year research project.

Sometimes actually they start in the summer before their final year and they basically have a head-start, so that is typical. Apart from covering the project costs such as equipment, running costs and maintenance in most cases we also pay salaries to students so they can be employed while they are doing their research projects. [Engineering 1]

Whereas others felt that it was unfair for those with a summer scholarship to start early and had changed the rules relating to fourth-year research projects. Students were now only allowed to start their research project at the beginning of the year, so that students working on research projects over the summer did not have an advantage.

We offer some summer scholarships to students in the research groups, and quite often the third year students will take those up. So we have had the situation in the past where students are already in here, and enrolled, and managed to get a summer scholarship. They would start on their Honours project, and so that was an advantage, that was the problem. So we made a rule that you can't start before February 1. [Science 4]

In this case the Coordinator took responsibility for ensuring that everyone had the same opportunities in their Honours project, whether they continued on to Honours from the undergraduate degree or entered the program from a different university.

> *And if a student is working with their supervisor over the summer, and it does happen to be their Honours supervisor, it is my job as the Coordinator to go and make sure that there is no overlap. They have to clearly demonstrate that they are different. The other reason is that we have students coming in from other universities as well, and we like to give everybody the same starting line. [Science 4]*

For one professional discipline with an industry-based research project, however, it was more beneficial for the student to take a job with local industry rather than a summer scholarship.

> *There have been some instances with external collaborative projects with local industries. Students have gone and worked at those industries for the summer vacation so they get a bit of a hands-on experience, as well as a bit of an insight into what they might be expected to work on for their Honours year. [Engineering 2]*

The opportunities for students to participate in research grants were predominantly in Science and Engineering. Only one of the Arts disciplines had gained a competitive research grant where students could have some involvement. This was in an emergent research area, with the new practice causing some ethical concerns because it was perceived to be the first time students had participated in an Honours project for financial gain.

Increasingly Honours scholarships are used to entice undergraduate students to take up areas of research specialisation in the hope that these students will then continue on to postgraduate research in these areas. Since collecting data at this site targeted Honours scholarship programs have been introduced on an institutional level across all disciplines to encourage students to participate in Honours.

There have recently been dire forecasts about the reduction in the numbers of academics teaching and researching in universities (Bradley et al, 2008, Hugo, 2008). Consequently the federal government aims to increase the numbers of higher research degree students, and also those continuing on an academic career path, by 2020. A key element of this strategy relies on the fast-track progression of Honours students to doctoral research programs, however, there is increasing concern over the doctoral scholarship framework which supports successful Honours students in continuation on to doctoral study (House of Representatives, 2008; Kiley et al, 2008; Zeegers & Barron, 2008b; Neumann, 2003). The next section looks at the frustrations raised by academics from this site about the availability of scholarships for PhD students.

4.8 Doctoral scholarships

A number of respondents from different disciplines identified concerns with the Australian Postgraduate Award scholarship system. The awarding of scholarships on the basis of gaining First Class Honours was seen by some as a contentious issue. It was felt that in some cases this had affected the quality of Honours programs, as disciplines without any First Class Honours students found it difficult to attract PhD students when they did not qualify to apply for a government scholarship. It was also perceived that some disciplines were 'bumping up' the Class of Honours received by students in order for them to qualify for the award and continue on with further research studies.

A number of Coordinators spoke of doctoral scholarships and the tensions surrounding the process to highlight some of their concerns with the higher education system in general. The Australian Postgraduate Awards (APA) system was seen to have consistent selection criteria which operated uniformly across all disciplines. It was dependent on disciplines having Honours students who graduated with a ‘First’ or who are recognised as ‘Honours 1 Equivalent’. In this way, scholarships were linked to Honours results. These First Class Honours students are considered the finest in doctoral admission (Kiley et al, 2009) and some of the promising students had been ‘courted’ by academic staff since their undergraduate years.

> *…by the end of third year you have seen the students and you know what they are capable of. The good students you try to direct into a project that will extend them, and allow them to get the highest grades to then qualify for research scholarships. [Engineering 2]*

The interviews identified a frustration with the present system. There was a perception that a number of students who did quite well in the Honours program, but only received a Second Class First Division (2/1) Honours, rather than a First, would be just as successful at carrying out higher degree research.

> *I think that my experience is, that those that have got firsts kick on a bit better into their PhDs than the 2/1s, but it certainly doesn’t mean that the 2/1s can’t finish just the same. [Business 1]*

These students are not eligible for a doctoral research scholarship under the rules governing allocation of APA scholarships, and if they chose to continue on to a doctoral research degree they needed to support themselves through other means.

> *You need first class Honours usually to get a competitive scholarship, but we often enrol people who have got a 2/1 to do the PhD. They do it without a scholarship, supporting themselves perhaps through casual teaching or by other means. [Business 1]*

In some Schools there had not been any First Class Honours awarded in a particular year meaning that there were no scholarship students to continue on to further research within the discipline. Students who did not qualify for a research scholarship often had to leave study to take up full-time employment as they could not afford to stay at university.[3] This caused a great deal of exasperation for academic staff:

> *…getting an APA scholarship…that's increasingly, ridiculously competitive, so we are losing students who would turn out to be good PhD students, and quite competent PhD students. We are losing them because they are not getting an APA scholarship … they didn't get First Class Honours, and so they are ineligible. [Science 3]*

This has made winning research grants even more important in order to attract doctoral students to study within the discipline. If research grants were gained, strategically it was sometimes better to offer that research scholarship to an Honours student who received a lower class of Honours degree rather than a First Class Honours student, to maximize the number of scholarships that their discipline was able to offer. This meant that instead of selecting students on the basis of their interest or specialisation, they were selected for scholarship on merit basis only. In this way the discipline received more government funding per postgraduate research student.

> *If somebody has won a large grant that includes a PhD scholarship, the 2/1s can do it. While we would prefer a First Class Honours graduate to take that scholarship, because it is not a competitive process it is more strategic for them to apply for an APA. The necessity for Firsts is really about funding. [Business 1]*

The findings from this study raise similar concerns to those found by Kiley et al (2008) and it was clear that an investigation of the APA scholarship system is needed. Indeed unease about this process is causing some to question Honours programs as a whole, and how the assessment of achievement within Honours can be used as such a widely based selection criterion when little is known about the

[3] Since data collection in 2005, the university has considerably increased the number of scholarships available and has allowed Honours 2/1 to be eligible for scholarships

comparability of Honours programs across Australia (House of Representatives, 2008; Zeegers & Barron, 2008a).

4.9 The relevance of fourth-year research programs

Australian Honours programs are justifiable, economically and academically in the view of academic staff. The year prepares students for further research in their discipline, adds generic attributes for employers and is more cost effective than a two-year Masters course. Because it is an undergraduate degree, it is still seen as an important pre-cursor for advancement within the discipline. For the professions, students have an extra year to meet requirements imposed by accreditation authorities and to explore a specialty or to strategically align themselves with an employer through their completion of a work-based project designed to apply their knowledge to real-life situations.

Those interviewed were asked to nominate the primary reasons for offering an Honours program and these were self-nominated (not presented as a list to select from). There was unanimity that Honours provided research training and employment capability, a finding that aligns with a similar analysis by Kiley et al (2009). In addition, respondents in the End-on programs nominated faculty reputation and morale, knowledge of the discipline and as a bridge to a PhD as reasons for offering the Honours program. Whereas respondents from Embedded programs nominated that they offered the research project to inform professional practice. Accreditation was a specific reason nominated by the Science and Engineering respondents, demonstrating the strong role of professional bodies in these disciplines (see Table 7).

Table 7: Primary Reasons for Offering Honours by School

Type of Honours	Embedded Honours			End-on Honours			
Reasons	Education	Engineering Built Environ	Speech Pathology	Arts & Social Sciences	Business	Communication & Design	Sciences
Research Training	*	*	*	*	*	*	*
Employment capability	*	*	*	*	*	*	*
Faculty reputation & morale				*			*
Bridge to PhD				*			*
Knowledge of the discipline				*	*	*	*
Accreditation		*					*
Inform professional practice	*	*	*				

4.9.1 Research training

Undergraduate education and the path which leads to a doctoral program is seen as one of the early stages of an academic life-cycle. As such, the fourth year or Honours year in Australia is an important stepping stone. Honours programs provide research training and the opportunity to develop research skills.

There were historical reasons for this perception, based in the Science-based disciplines. Indeed some of the Coordinators had an expectation that Honours students would continue on to research higher degree programs:

> *The primary reason is a stepping stone to research…the academics in the discipline see it as research training, and they would expect that most of their students would move into a Masters or PhD program. [Science 3]*

Honours research was seen as an important part of research within the discipline and in many cases was used as an exploratory tool to identify new research projects and pilot such work.

> *A lot of research done at the Honours level leads into research which is quite often the stepping stone to new research projects. [Science 2]*

In addition to conducting exploratory research within the discipline, the Honours project could also contribute as a part of a larger research project. Once Honours students progressed to PhD level, they made important contributions to the discipline and were seen as driving the research process.

> *An Honours student doing a little piece of research can contribute to the larger picture. And if you didn't offer Honours, you wouldn't get a flow through of students into a PhD and it is really the PhD students that drive the research. [Science 2]*

Moreover it was not only the End-on programs which were seen as a good source of new PhDs. In Engineering:

> *I think it is a good stepping stone. Certainly anyone who has done well in the project really is set up to do the same steps in a lot more detail with a greater technical difficulty, but transfer the skills quite well. [Engineering 2]*

In a number of disciplines Honours students were seen as an integral part of the research development within a discipline and a clear path to an academic career. In a wider sense, one Coordinator explained that if they did not have Honours students then the whole university system and national research output would be in jeopardy:

> *If we don't have a flow through of Honours students into postgraduate programs and therefore onto academic careers then the whole system basically falls over…the university in one manner is the research development department for the whole country. [Arts 6]*

Not everyone was willing to support Honours programs unreservedly, particularly with respect to projects that did not align with school interests, given pressures on supervision time and resources.

> *I don't really have the money in a strategic sense to go off and help this student do a project that they are interested in and which might be quite peripheral to my focus…You have to get publishable runs on the board, and even though that student might do something quite good, it may not necessarily lead to a publication for all intents and purposes, and I don't have the time or the resources to continue that on… the main issue is that they've got to come to an agreement with their supervisor as to what project they are going to do. [Science 2]*

And there were times when students were encouraged to be more mobile if they were truly interested in an academic career.

> *One of the things that I would encourage … is that it is good for students in this university who have done a really good Honours year to then go and do their postgraduate studies somewhere else. These are the students set apart, who want that academic career, it is harder to get the recognition that you have done really good work unless you go somewhere else. [Arts 4]*

In general Honours programs were perceived as the first milestone in an academic career. However, it was recognised that, excluding intrinsic interest, the other incentives and rewards of an academic career were not particularly compelling. Academic starting salaries were comparatively low, and research grants were hard to get.

> *They can make so much more money if they go out and be Engineers. [Only] the person who is really focused on doing research stays on. You might get peaks in students who are willing to stay around during recessions and things like that. I have had another academic say 'Bring on the next recession' for that reason. (Engineering 2)*

Some disciplines would like to have students continue on to postgraduate studies, but realistically do not expect them to forgo higher salaries and good employment prospects to do so.

> *Mainly I believe because the job market is very good, they tend to get a lot higher salaries if they go and work outside, so at the moment it is probably about 10% (of fourth-year students who continue on to research higher degrees) - it is not much really. We have had difficulties attracting postgraduate students in general. (Engineering 1)*

This theme was very strongly argued in the House of Representatives report (2008) relating in particular to stipends and the unattractiveness of research careers. They stated that the three major impediments to attracting researchers to academic careers outlined by the committee were: 'scarcity of opportunities, lack of job security and uncompetitive salaries.' (p.109)

The next sub-section will look at wider job opportunities from the coordinator perspective.

4.9.2 Increase employment capabilities

Honours projects allowed opportunities for students to access more challenging and rewarding job opportunities owing to the increased employment capabilities Honours programs provided.

It was also perceived that Honours graduates had more likelihood of reaching higher level positions in an organisation due to the skill set they developed in Honours programs.

> *We are well aware that for students to have the opportunity to do Honours it opens up jobs which would simply be unavailable to them. Doors are opened, though it is not just that jobs are well paid, they are challenging and interesting, and people are in the workforce for a long time so they may as well be doing something that is of interest. [Business 2]*

> *It makes a better graduate at the end of the day, one who is more competitive in the workplace, and also providing them with the skills to make it higher up in the organisation. [Science 1]*

> *Our take-up rate in terms of employment is really high (so) they are not more likely to get a job. But what it will do is get them a better job. The Honours students will go on to work at a different level than the undergraduate students. [Arts 6]*

Improving networks with industry not only provided students with better prospects and a chance to showcase their skills, but also provided better information both ways.

> *When we have our research seminars, which we have invited outside people to come along to over the past five years, as soon as we had outside people come along it was amazing. The presentations are usually better than those I see when I go to a conference in our discipline. We have people come along who represent the profession and government departments, and they have been suitably impressed. I think the quality of our theses have improved as a result. Students feel that other people beside academics are interested in their work, and that helps. [Engineering 3]*

However, high employment was not an expectation in all Arts-based disciplines as this Coordinator pointed out:

> *There is a wide feeling out there that unless you add a bit of substance to the degree by doing an Honours, is not worth that much …an Honours degree shows that you are capable of high level work and does demonstrate to a potential employer your research strengths which are generally applicable across a range of areas. [Arts 1]*

4.9.3 Inform professional practice

Having a close relationship with the members of the industry or profession provided a number of important advantages for those involved in professional-based programs. One was the opportunity to get hands-on experience of research in the field:

> *We generally get requests from the field for projects which need to be undertaken. We have a strong relationship with our field. Our students do placements…so that is another place where they often get hands-on experience of research. [Arts 8]*

The chance to be involved in real projects, and interact with clients, was coupled with an opportunity to 'give back' to those communities by having students work on projects which otherwise would not be completed due to lack of funds.

> *Most of what [Honours students] do is pro bono, is community service type work for people who haven't got any money. You have got to talk to the students regularly during their projects because they are doing real projects for industry in the real world…and I speak to the industry people regularly too. [Arts 7]*

In most professional-based disciplines, learning to interact one-to-one with clients was a big advantage for students conducting a research project that mirrored real-world conditions.

> *They can actually do a community based project where the client comes along…we would expect students to do everything themselves. We want them to know how to deal with clients, find out what clients want and then get back to them. [Engineering 4]*

Others in professional fields were inclined to conduct projects which would help them to reflect upon, and hence inform, their future professional practice.

> *We have encouraged students to tie the research project in with their actual teaching, reflecting on their practice and improving their practice. [Education 1]*

However, many of the newer professional disciplines were still finding their way, and trying to justify the importance of research in their field.

> *There is still quite a fear…a sense that this is not what we are here to do. Research (in our profession) is seen as a bit distant so we are trying to break that down as much as possible. [Arts 8]*

In this sense, newer disciplines, without the tradition of doctoral research, were redefining what it meant to be a researcher in their field and consequently what Honours programs were designed to deliver. What makes an exceptional student of 'Honours quality' in that discipline?

> *I want to teach my students humility…it is about having a socially responsible attitude to community. [Arts 7]*

4.9.4 Accreditation

In the Schools of Engineering and Science, accreditation was nominated as one of the primary reasons for providing a research or industry-based project in fourth year.

> *It is a funny sort of thing in that our accreditation body says you shall do a project…we get industry people saying we would like a project run in this area. [Engineering 2]*

The accreditation process gave the Honours graduates in Science increased mobility within Australia, so that the degree would be recognised at another institution to complete their PhD.

> *At some point if you want to pursue a research and academic career you have to go out of your home institution. Normally this is done after the PhD. I don't think there is any difference in perception of the student's ability if they have done that. [Science 2]*

One accreditation body had an industry-based committee who assessed programs for equivalence, so that students could then move freely between both undergraduate and postgraduate programs.

> *In our discipline we have a National accreditation process through the Australian Institution and they have a committee who goes around to all the universities in Australia and assess their undergraduate and postgraduate programs. So somebody who has done a degree here in Newcastle is quite equipped to go anywhere else. [Science 4]*

In one Engineering program the accreditation body recognised the University of Newcastle program to be equivalent to the Masters program in Europe, allowing graduates increased mobility overseas.

It is a requirement from our accreditation bodies…having that accreditation allows our students to actually work in Europe, we are the equivalence of a Masters degree in Europe. [Engineering 1]

This is interesting given the concern expressed that Honours would not be a recognised qualification in Europe.

4.9.5 Importance of Honours

Strong feelings emerged throughout the interviews about the importance of Honours to the disciplines within higher education. Indeed some Coordinators were quite passionate about the need for Honours, recognising its importance to the discipline. It was felt that the presence of Honours made a profound contribution to the research climate:

I think it is valued by all the academic staff, and it is crucial to what we are doing…if you have that research culture within your corridors it makes everyone more productive. [Arts 1]

Honours year is an absolutely worthwhile year for students to undertake. [Science 1]

We see it as an absolutely essential part of our portfolio of programs…I would fight to the death to make sure that it is retained no matter what. [Business 1]

The year was seen as an opportunity for undergraduate students to focus on developing their research skills, before making the decision of whether they would graduate to the work place or continue on to further study.

I thoroughly believe in it because it gives you a chance to start flexing your research muscles. [Arts 2]

Statements reinforced the potential of Honours students, which could otherwise lie undiscovered or unrecognized by the students themselves.

> *One of the primary reasons for Honours is to develop the research skills of talented students and also to some degree to target more gifted students who have the potential to go on to a PhD.*

> *To stimulate the interests of students in areas they are keen on and may well never have known existed. [Science 3]*

There was more than a little regret that more students did not avail themselves of the opportunity to use their research skills as they were more attracted to employment within the industry:

> *The job market is very good and that influences both the intake of Honours students and what they do after. [Business 2]*

> *If you have a PhD realistically you are only going to go to university. I guess you would say that there is not really any goal you can aim for in Australia after completing a PhD. It is a pity. [Engineering 4]*

After many iterations of reading and rereading the transcripts there emerged an intangible element to Honours which underlies the importance of the capstone research project in a student's final undergraduate year. Members of staff describing the program are passionate about its value to the discipline and identifying potential candidates to carry on the tradition of their specialism into the academy.

4.10 Summary

This chapter explored the range of research opportunities available for fourth-year students and the reasons for offering Honours projects across a range of programs. There was a wide scope of experiences available to students depending on the type of program. It was agreed by respondents from all programs that the Honours year provided research training and enhanced employment capabilities for students. End-on programs offered one-year research projects to develop disciplinary knowledge, to enhance faculty morale and as a bridge to the PhD. Fourth-year embedded research programs aimed to inform professional practice. In addition, accreditation was relevant in terms of the research project for Science and Engineering.

The question of discipline was not the main focus of the research project but emerged as an important area of analysis, with commonalities being found between humanities-based, science-based and professional-based disciplines. Elements of the research environment were explored including: research training provided; student involvement in scholarships and research grants; and student interaction with the learning community. Many readings of the transcripts also uncovered an underlying positivity towards undergraduate Honours programs and the value of discovering promising undergraduate researchers before they leave academe and enter the workforce.

It emerged that Honours programs have hidden, and previously uncovered, potential which have intense value to those within their discipline, but are undervalued or oversimplified by those who do not understand the particular area from whence the program has evolved. In the next chapter, in-depth examination of the key outcomes of Honours programs for students is explored from the perspectives of Coordinators, and stories of development of research skills for successful students are outlined in the context of the different disciplines to contribute to the idea of research preparedness.

5. KEY OUTCOMES AND DEVELOPMENT OF SKILLS FOR FOURTH-YEAR RESEARCH STUDENTS

5.1 Introduction

The previous chapter identified the strong attachment to Honours programs by academic staff as well as the organisational and more instrumental aims of such programs. This chapter presses further, probing the meaning that Honours programs hold for these staff, particularly as they relate to the student experience. The following research question is addressed:

> 3. What do faculty members believe are the key outcomes of the research program for Honours students?

There were five key outcomes which emerged through the analysis of the interview data: further grounding in the discipline, developing transferable skills, learning research skills, gaining confidence and developing resilience with research, and uncovering promising researchers. The first section of this chapter investigates how these outcomes are understood.

One aspect of Honours that was bought to the fore in the interviews was that of skills development and this was related through stories of success and struggle witnessed by coordinators. The stories detailed in this chapter also give more of a sense of the 'hidden potential' of Honours - why academic staff would 'fight to the death' to protect Honours and why they see it as a vital part of the university environment. The next chapter reports on the student experience for those participating in fourth-year undergraduate research programs.

5.2 Key outcomes of Honours

There has been some discussion surrounding the value of Honours programs in relation to research training in universities (Zeegers & Barron, 2008a, 2008b; Kiley et al, 2008). It has been argued that it may be more beneficial to have a generic 'one size fits all' research training program to prepare students for both higher degree and industry-based research as a part of the postgraduate course offerings (Enders, 2005). In response to the changes in higher education in Europe, one Australian university has already restructured the undergraduate Honours programs into postgraduate research degrees to align with the 3+2+3 model across Europe (details were given in Chapter One). Nevertheless, there is only anecdotal evidence that an Australian Honours program gives undergraduate students 'something extra' in most disciplines, as how the experience equips students for further research or for the workforce is largely unexplored.

Therefore one of the focus areas when interviewing Coordinators was to identify the key outcomes of fourth-year undergraduate research programs for the students across different disciplines. The key outcomes identified by the majority of discipline areas included a better grounding within their discipline, transferable skills for the workplace and developing research skills. There were two other key outcomes identified by the coordinators for students across all discipline areas in the study: developing confidence and a sense of resilience in carrying out research and uncovering research potential in students whilst they were still an undergraduate student (See Table 8).

Table 8: Key Outcomes for Honours Students by School

Type of Honours	*Embedded Honours*			*End-on Honours*			
Key Outcomes for Students	Education	Engineering & Built Envts	Speech Pathology	Arts & Social Sciences	Business	Communication & Design	Sciences
Uncovering Research 'Potential'	*	*	*	*	*	*	*
Confidence and resilience	*	*	*	*	*	*	*
Grounding in the discipline		*		*	*	*	*
Learning research skills		*	*	*	*		*
Transferable skills for the workplace		*	*	*	*	*	*

5.2.1 Grounding in the discipline

A better grounding in the discipline was one of the outcomes of Honours programs volunteered by most coordinators (the exceptions were Education and Speech Pathology). Grounding in the discipline became more pronounced during Honours as the student gained experience, enabling the student to focus their interest in an aspect of the theory or practice of the discipline.

In the Industry-related programs, students were still enrolled in fourth-year coursework and electives whilst completing their research project, which were often based within their specific field of practice. The project involved learning beyond discipline-specific skills and knowledge as they sought to solve the problem:

> *[Students] learn about research culture, widen their horizons, thesis writing skills and research skills, and particular skills on the topic which can be programming in a particular language, or some mathematical skills or graphics. [Engineering 4]*

Another engineering coordinator stressed the potential for applying knowledge to a real-life situation:

[S]ome of our courses can be very mathematical, and you can often struggle to see where that can be applied anywhere other than in a research field. The project however can be a very practical focused thing, so students sometimes get in there and go 'Wow, this is great! This is what I have wanted to do all along!' [Engineering 2]

In the Science disciplines, where there were many skills required to conduct research within a laboratory, the supervision was more intense at the start of the candidature:

> *You can see throughout the course of the year how the level of supervision required for an Honours student declines... From the start of the year where a student is clearly an undergraduate and when the transition to becoming an Honours student commences. [Science 1]*

Whereas the small class sizes in the Business discipline allowed staff to work directly with students to increase their disciplinary knowledge:

You actually learn more about the discipline through Honours than you do in the other three years put together…that is partly because of the intensive nature of the coursework, they are in very small groups working very closely with staff. [Business 1]

In Arts-based Honours programs this is often the first opportunity students have to learn about an area within the discipline which specifically interests them and to be able to explore that aspect in depth.

Honours provides students with a way to ... drill down to a more specific interest that they might have picked up in undergrad. Someone you thought wasn't really interested in the course suddenly latches onto one aspect…they really want to run with it. [Arts 5]

Some students did not confine their learning within the boundaries of the discipline. As the boundaries of disciplinary knowledge become more blurred, it is not unusual for supervision to occur across disciplines. Indeed, some industries encouraged their future employees to 'think outside the box'.

> *I am just thinking of one chap we had…he chose in his Honours thesis to explore a very, very high tech idea that involved a very complicated bit of physics. Now to get supervision we 'hauled in' [found Co-Supervisors from two other Faculty areas–Science and Engineering]. He was consulting Engineers, Astronomers, just working out the physics of it…it was very detailed... Obviously he went through a huge knowledge explosion to do it, but what was so fascinating was watching him have the opportunity to do that. Nowhere in the course had we given him the opportunity to use that way of thinking, so that was a developmental story. [Arts 3]*

There were a number of ways in which different disciplines gave students the opportunity to learn more about their discipline; whether by giving the opportunity to learn more about areas of specialisation, by providing cross-disciplinary opportunities or by providing an opportunity for students to apply the knowledge they had learnt to a real-life problem within their industry. As the student moved through the process of independently examining a problem within their discipline, they were also in the eyes of their supervisor developing more expertise in their area.

5.2.2 Skills transferable to the workplace

As discussed by Winn (1995) there are skills gained through the experience of undergraduate research which can be transferred to the workplace. She identified skills such as project planning, communication, presentation, data handling and ICT skills as being important. Todd et al (2004) also identified independence and confident self-directed learning as important to future employers.

This section outlines some of the transferable skills identified by the Coordinators, which were discussed in all disciplines except Education. This may be because the research project for these students was based in their internship school where students were involved in a 10-week practical experience. The link to the workplace was therefore implied in this situation.

Coordinators in this study identified a number of key capabilities which they felt were important for students to achieve within their projects. Working independently to accomplish a goal was seen as an integral part of the project and, within that, ensuring all components of the project were completed within the timeframe. This required the student to employ elements of project management, which were not taught within the course but were learnt as the student progressed.

> *I guess they get to work out what is required to achieve a goal, because they need to work independently. They have got to set themselves up, define what they are going to do, organise their time over the two semesters so they can get the job done, do some background research in terms of finding out more information because there is always an element of learning in the project. [Engineering 2]*

Prioritising within the project and time management were skills that were applicable in all disciplines, as summarised by a Coordinator from a Science program. Students had to learn to be strategic about which tasks they would give the most time and effort towards, and it was acknowledged that, although this skill was not taught as part of the course, students needed it to do well.

> *Students have to learn a little about managing their assignments, how much time they are going to spend, and sometimes they may not have time to do their very best. They have to try and think about where they are going to put their time. So there is a whole organisational prioritising skill, even though it is not formally taught it is imposed upon them. [Science 4]*

On the whole coordinators identified some very positive outcomes for those who participated in the Honours research project, whether they intended to take the skills they had learnt with them to the workplace or to continue to further research as a part of the academic community.

5.2.3 Learning research skills

Coordinator comments relating to how students learned the process of research across different disciplines shared a similar language and process. There were indicators which showed that students were learning the skills required for independent research and also more in-depth comments showing the unspoken struggles involved in mastering their research project.

As illustrated in the framework developed by Willison & O'Regan (2007) students involved in inquiry need to determine a need for knowledge or understanding in order to engage in the research process.

> *They can articulate clearly what their aims and objectives are, and how they went about designing the project. [Arts 3]*

Students also need to apply the knowledge they have learnt throughout their coursework degree to a specific research topic.

> *It is not so much a matter of cumulative learning but refining your ability to respond to problems. [Arts 1]*

Students are engaging in independent inquiry where they need to differentiate between what is required and then write a substantial paper reflecting what they have done using the appropriate structure.

They are engaging in research work, which is very different from what they have done in an undergraduate level. I think it then prepares them to be able to do independent research, and also to write reports, write coherently…being able to present a substantial piece of work compared to a 2000 word essay, that is a quantum jump and a useful skill. [Business 2]

The research project is a central aspect of the fourth-year program because it drives students to move beyond the regular curriculum. It challenges students to think independently about their disciplinary area.

What they really learn is lateral thinking. They also learn the tools to carry out their research projects, in terms of how to go about a known problem… they can take that knowledge that they have gained here and apply that to other situations, and that is why the individual project is of value and is important. [Engineering 1]

Learning the requisite skills required in research occurred as students became more independent in their approach to learning. A part of the process of transition to a more experienced researcher is the intellectual movement between confusion of ideas and moments of insight which Todd et al (2004) term 'cosmos and chaos'. This struggle was identified by a number of the Coordinators interviewed, as the students grappled with both the intellectual challenges and the expectations of the program.

We like students to actually think about the project themselves. Sometimes it is extremely difficult to do that, and it is really hard for them to come to grips with actually trying to do things themselves. It is a big shock to some of them because they are in a professional degree and once they leave here they are going to be expected to be productive and think for themselves, and it is a slow process for some of them. Some of them, even once they graduate, take up to a year to think for themselves. Research is making decisions. And it happens even if you are doing purely a research project, you actually have to think about everything yourself and how things happen. [Engineering 3]

One of the Coordinators articulated the tension some of the students experienced as they coped with the rigours of the research program, and identified that this deficiency was often not spoken about.

> *…it is an unspoken sort of thing, they see that it is a lot harder than what they thought it was, or their passion for a particular topic is not enough to get them through the theoretical rigour of the thing. So that is one reason…I think that Honours simply strains them. [Arts 5]*

The unspoken struggle of student researchers was one of the silences in the interview data, as was the lack of rescue for these students. There was even a sense that if a student did struggle then it was probably because they were lacking in some way or not coping with the unstructured program, as described by one Coordinator:

> *In most Honours courses, there are just too many opportunities to slack off and go some other way in the cracks…if you don't have the appetite or the hunger then probably Honours isn't for you. [Arts 4]*

Self-determination was an important attribute as students realised they need to take ownership of their research project. One coordinator described this 'turning point' for many beginning research students:

> *They [the students] are the drivers of the process, rather than the research project being given to them. [Science 3]*

5.2.4 Confidence and resilience

Coordinators described a capacity for research, where students demonstrated a confidence and self belief that they would be able to complete the research project. This theme was particularly prevalent in the interviews with Coordinators from the Arts programs, across a range of different types of Honours.

In the comment below, the Coordinator captured the dichotomy of the research experience for their students:

> *They are fragile and they are tough, at the same time. They want to succeed, but are frightened of succeeding. [Arts 7]*

Some students, who did not think at the commencement of their project that they would be able to fulfil all of the components of the research project, found that they were confident enough in themselves to finish it.

> *Self belief. In Honours Year the task seems huge at the start and it is off-putting…typically you have people who thought they couldn't work like that actually get to the point where they can work like that, to come up with an idea and see it through. [Arts 2]*

> *Personal growth is exponential. From my point of view that is the best thing you can get out of it. Their whole world view in that sense changes. And their confidence in their own abilities just goes way through the roof. [Arts 6]*

Even for students who achieved at the highest level in their Honours program, there was still the issue of confidence. A Coordinator commented below on a student who received the University Medal at Honours level, and who without this may not have continued on to complete his PhD. When contemplating a research project you need more than the 'ability to succeed' or a 'potential' for research, you need to believe you can complete the project.

> *I have a PhD student at the moment who got a university medal at Honours level. He is now expanding his Honours thesis into a full PhD. He has only got a year, six months to go. In those situations you can see the clear benefit of offering Honours to someone like that, who was clearly brilliant, but didn't have much self confidence. The university medal aside, just doing Honours was a huge confidence booster. [Arts 5]*

The following Coordinator discussed the change and growth in students from when they presented their ideas at the start of the project to their presentation at the end.

> *Comparing [students] between their first presentation and their second presentation is just like chalk and cheese. The thing about the students on an anecdotal level is that they are very nervous, very panicky, before the first presentation. Because they have not been in that situation before in terms of having to justify themselves intellectually and academically in front of their peers and other academics and so, it is rather like a mini-conference for them. So the anxiety levels are really high... So there is a radical shift in confidence, which is the thing. That is the thing that strikes me every year about those Honours students is to see the growth. [Arts 3]*

Clearly the Coordinators in these Arts programs felt that confidence in their research ability was important to the success of students in the Honours research project. However, in research you do not always succeed, and so it was important to have time to experience failure and to learn to be persistent and to pay attention to detail.

Students need to demonstrate a confidence to complete research tasks and resilience to bounce back when things did not go to plan. The study by Lovitts (2001) of doctoral student's perception of their experience in relation to attrition found that the transition from course-taker to independent scholar was hard for students and that many students left the course at this juncture.

In Science you needed to make mistakes to learn, and this was not usually possible in the undergraduate program where experiments were closely monitored and controlled by experienced laboratory staff.

> *Walking into a research laboratory and being confident to do what that laboratory is doing…that requires quite a diverse range of knowledge and skills and you don't really learn that knowledge or skills in a practical sense in an undergraduate degree. You just don't have enough time in the lab to make all the mistakes you would normally make...whereas in Honours that is almost their full time preoccupation. [Science 4]*

As a student becomes more experienced in research tasks their dependence on their supervisor decreases.

> *You can see throughout the course of the year how the level of supervision required for an Honours student declines... From the start of the year where a student is clearly an undergraduate and when the transition to becoming an Honours student commences. [Science 2]*

A passion for their specialisation could be an indication that they had the motivation to complete research at a high level of expertise:

> *Some people get passionate about what they like and from that comes a very strong motivation to complete thorough, excellent, innovative research. (Science 2)*

In Engineering, students who were more successful in the research components of the program explored things for themselves rather than studied what lecturers told them to:

You see it clearly, some students prefer to basically try different things, explore things, but some students are used to being told what to do, what to read, when to do everything, and so you see the difference. Generally students who have this curiosity, are more successful than the other people. [Engineering 1]

Some students were excited by making the transition from coursework to research. They were excited by the realisation that they are involved in researching something new.

Making the transition from being a consumer of knowledge, to actually being a producer of that knowledge, and quite often the realisation that the research they are doing is the first time that work is being done…most students find that really exciting. [Science 2]

As students in the Honours program discovered what they were capable of achieving, their confidence grew and they realised that they had the ability to research.

It is very self satisfying to see the transformation of relatively young adults who don't know their capabilities to quite confident people who think they can fix all the world's problems. [Science 4]

As well as being transformative in terms of being a researcher, the experience of Honours could also change the direction of a student's career.

[O]ne student discovered that this is the career. He had always wondered, but now just loved every bit of the process. He collected data and he just said 'This is it, I am home. I know that is where I want to go'. [Arts 3]

5.2.5 Uncovering research 'potential'

Honours can be a transformative experience and one where student qualities such as curiosity, excitement and passion can indicate a potential to succeed even when previous academic achievement may not have been sufficient to indicate a strong likelihood of success. Findings which emerged from the study indicated that Coordinators perceived that the undergraduate student research experience gives students a unique opportunity to demonstrate this 'potential' for research.

> *The sort of thing that always strikes me is that Honours offers an opportunity to shine…[students] have had that all along but that they couldn't demonstrate it. [Arts 3]*

Honours lies in the nexus between undergraduate and postgraduate studies. The research project adds value to coursework degrees by giving students a chance to experience the process of open inquiry.

> *It gives them the ability to articulate thinking and ideas, which they don't get in the undergraduate degree. [Arts 7]*

Sometimes undergraduate students who are 'coasting' in their coursework degree do well in their research project because they have found something they enjoy doing.

> *Sometimes you get students that really surprise...you look at their WAM [4], because you always try to get a bit of an idea at what you have got yourself in for, and ... it is in the middle of the range or towards the bottom end... [T]hey can really blossom in that they can finally do something that means something to them or fits with their interest. So you will get students like that who pull out a sensational project from nowhere. [Engineering 2]*

[4] Weighted Average Mark (used only in Engineering)

On occasion students with a credit average in their coursework program will surprise their supervisor by achieving at the highest level in their research project. These students stand out to coordinators because they fit so well with their image of the 'ideal research student'.

> *There are [students] who adapt to Honours like a fish adapts to water ... you may actually have a surprise where someone who has usually been a high credit student goes on to get a First Class Honours [in their research thesis] because they have adapted to the different level of work as if this is what they have always been wanting ... to get the problems in depth. [Arts 1]*

Students with the highest coursework marks were not always the ones who were good at research. However, others thought that within their specialisation it was usually the students who graduated with First Class Honours in the Bachelor degree who tended to also do well in their Honours program.

> *I think ultimately it is often nice to have those Firsts who have a little bit of extra spark and…a bit more brilliance. (Business 1)*

This idea of discovering research potential in students is encapsulated by different Coordinators using a range of images – 'adapting like a fish to water', 'blossoming', 'an opportunity to shine' and a 'bit of extra spark'. Honours students who become immersed in a problem or issue do just about anything to explain it, or to comprehensively document the phenomenon that interests them. These students demonstrate the qualities that could sustain them through a larger project to achieve something substantial and possibly new and original.

The essence of the Honours culture is the desire to know and there is 'promise' within each undergraduate student to become part of this community. Students who achieve well in their studies are not always going to have this desire, so Honours acts as the testing ground to find those 'sparks of light' in students who have a passion to know and have the capacity to be productive researchers of the future. The senior academics within the discipline act as stewards in identifying the future apprentices for doctoral research in their area (Walker, Golde, Jones & Bueschel, 2007) to protect and nurture as the numbers within the academy continue to dwindle (Hugo, 2008).

5.3 Development of research skills

Building on the previous section on discovering research potential, the following stories told by the Coordinators typify the journey of the successful students within their discipline and the transition students undergo when learning to be a researcher in a specific area of expertise. They serve as windows into the underlying culture of Honours within the discipline.

The stories and incidents are told from the perspective of the Coordinators in first person style. They were selected in order to show the student's development of skills during the research project across a variety of Honours programs. The disciplines were not explicitly identified, however, some unique identifiers were not removed so as to preserve the context on which the illustrations were based, where confidentiality was not compromised. Each of the sub-sections corresponds to information from one Coordinator. The names of students used in these stories have been changed.

5.3.1 Industry-based Engineering program

In this discipline the skills of students were developed specifically through the use of scholarships, grant money and industry partnerships. Being a professional program, it was difficult to interest students in staying on at University after Honours to continue to a higher research degree. The School had a number of staff involved in research grants and so there were available funds to attract more junior researchers. Often the Honours projects formed part of a project which academic staff were working on or involved a client-focused problem from within the industry.

The Coordinator interviewed had over ten years experience supervising students and coordinating the undergraduate research program. When explaining the development of research skills in more successful undergraduate students, he thought the better students came up with more novel solutions than the others and looked at all aspects of the problem.

> *I would see a very complete project, or what I would say is a complete project. The student would have thought about all aspects of what he had to do, rather than just focus on a particular plan. He has hopefully come up with some novel ways to achieve results, rather than just stumbling through the first way that seems to do the job, so those are the sorts of things I think that I would be looking for, and that I would see in the better projects.*

The Coordinator expanded on these general points by giving a specific example of a student whose success arose from his passion in a very specific area within the degree.

> *I guess I have got one student like that this year, whose thing really seems to be electronic hardware. Now he was probably a slightly above average student in terms of WAM, but I suspect he will get one of the better results this year in that he just loves to tinker and build things and he has assembled this great big mass of hardware, which all works, essentially because he just loves to experiment and try things out. So it has suited him.*

He explained how students were offered the opportunity to be a part of research projects within the School, which was not always possible in all disciplines dependent on the access to research grant money. In this discipline staff try to ensure that the fourth-year research project is kept separate to the paid projects that students may be involved in.

We try to keep what they do on their [student] project as separate. There have been cases where students will do a summer scholarship from a research grant. Then they might go and do a project based on what they have been working on. I don't know if you have heard about our robot soccer team. There is a bit of money associated with them, so often the guys who organise that search out the students who they think might be good, they give them a summer scholarship, and they work over the summer break between third and fourth year, and then they will come back and find a project in that particular area.

Sometimes students who complete a good research project with a particular supervisor will be asked to stay on and continue as a research assistant.

There are probably instances when guys have done a project, with a particular supervisor, and got to a point when the supervisor has said 'Hey, do you want to do six months more work, because you have learnt all of this stuff, do you want to do something useful for me?' and they are paid that way. Presumably we can't twist their arm to do a PhD or something like that. While the actual project is going on I think very few students get paid unless they are doing something industry-related.

There are instances where industry organisations have paid a student to conduct research for a specific purpose in order to attract a good student to the project and also as motivation to commit extra time to meet the industry deadline.

I have got a student this year who is doing something specifically where someone from industry wanted to achieve an outcome. To get a good student, or one who we were confident would get a result, we offered them 8 hours a week pay. So basically the applied part of the project, where the student was actually building circuits, creating prototypes, an employer paid her to do that. It was a very specific case, a guy is developing a wind turbine which he wants to market into China and he wants a low cost controller. He has got a deadline where he needs to have something that *works in a month's time, so at the start of the year I said well there are good students, we could easily do it, but you will probably need to pay them because they have got to commit extra time.*

This quote illustrates the inter-connectedness between the academic department and the industry of which they formed a part. There were accreditation requirements for the program and close monitoring of the professional qualifications required by industry employers.

There was also an added dimension during the assessment of research projects, as members of the industry were invited to come to the university to view the projects, adding authenticity to the program and giving students an opportunity to make an impression on and then to network with future employers.

5.3.2 Emergent professional Arts-based program

An emergent professional program in one of the newer disciplines attracted smaller class sizes, usually between 30-40 students in each year. The Honours was awarded on merit depending on the student's GPA across their four years of study. Research skills were taught throughout the degree.

Our model of teaching is called experience-based. We don't have lectures and tutorials, our whole course is based around the interactive working relationships between staff and students. We don't tend to conform to the traditional academic identity of someone being an expert in a narrow field, we teach much more as facilitators of learning, so all the staff move around. We constantly have to update our knowledge and we get in a lot of expertise when it is on particular topics to get different perspectives.

In fourth year the students were involved in a class research project that had a qualitative approach. The Coordinator received requests from the field for projects which needed to be undertaken and would then choose one as the class project. This gave students hands-on experience with collecting and analysing qualitative data. The program was taught with a team approach, with staff being involved in collective planning and shared ownership of the curriculum.

> *Because we are a professional program we have a lot of control over the programs that the students will study. It is a very structured program and the staff does work as a team. We do a lot of collective planning which means that as a group we oversee the student's gradual learning about research.*

> *Also running throughout the whole program is exposure to ... the broad theoretical base [of the discipline] and how that feeds into particular approaches and practice.*

As a newer professional research-based program, research was seen by the profession as something which belonged to the experts. Those involved in teaching the research project saw themselves as being instrumental in breaking down those barriers:

> *So as a profession it is trying to establish its own knowledge base. Research is a really important capacity that we need to embrace, but traditionally the academics did research and the practitioners did the practice. We try to break down those barriers as much as we can.*

The collective project was in aged care looking at the concept of personal-centred care within Nursing Homes. The aim was to tailor the care in the facility to the individual history of residents through incorporating the interests and capacities of individual staff. One key aspect of research in such an environment was the question of ethics, which was an integral part of the professional practice of social workers.

[Students] become very familiar by the time they get to fourth year with the problem of ethics... and they have to become familiar with collecting data according to the ethical procedures we have had approved, and how to implement those. They have to spell out the conditions of informed consent. Then again that ties into a broader experience in social work, with ethical practice anyway, but they are the main skills.

There was also a strong association with the field of practice, which kept staff in touch with the expectations required from graduates. Given the lack of research within the emergent profession, there were also opportunities to incorporate the action research into publications.

Our fourth year students have just won a conference on evidence based practice where they will actually have to write an abstract, present a paper and write the paper up to go into a journal. So again we are trying to encourage them to think about building knowledge in their profession, either through adding to the research base and/or critically evaluating what is out there.

5.3.3 Traditional Arts-based program

The following story outlines the development of an Arts student who embodied the development of research skills in their field resulting in a pathway to academe. The Coordinator had been a supervisor of Honours students for over ten years, and had seen his field develop over an even longer period of time. The story is told almost entirely from the perspective of the Coordinator to maintain the flow of the piece.

I had a student, in one of my first undergraduate courses. Her parents were refugees from Vietnam and in the 1970s they sought asylum in Australia. They were living in Newcastle, and their daughter came to university principally to do religious studies, as they were Catholic Vietnamese. But her own interests were in English literature, and she *impressed me in the course I was doing on DH Lawrence and Thomas Hardy.*

There is a famous scene in DH Lawrence's Sons and Lovers where the mother is locked out by her drunken husband, her miner husband, and she wanders around the garden on a cold night with the full moon out while she is pregnant with the son who is going to become her lover in some sense, hence the title Sons and Lovers. She sniffs at some Madonna lilies in the garden and I make the little point in the lecture that the Madonna lilies are called that because in depictions of the enunciation the angel Raphael bears these lilies when he comes to see the Virgin Mother, and it seemed to me that although this is a scene where the mother is already pregnant, she is re-conceiving her child not to be the son of the drunken miner who has locked her out, but to be a son of the universe, of the moon and the lilies and the cold night.

Deb told me that in a classical myth it was sometimes thought that women could conceive through the Gods, just by sniffing certain supernatural odours. The sniff of the Madonna lily is so powerful that the mother almost faints. Now students who tell you something like that, you think, boy would I like to get her into Honours. Deb did Honours, on an Irish poet that I deeply love. She said I want to do him as a religious poet. I said he was born a Catholic, but I don't think there is any religion in [that poet], why don't you try and do something else.*

She wrote her thesis on what she had intended to write it on and convinced me, she did marvelous research. She had the kinds of problems that students who are not born with the English language have with their writing, but she went at it with a tenacity which made me think that this is a student who can do research. And she got her First [Degree Honours], and got her University Medal, and went on and got her PhD along the way publishing her article. She is now like most PhD students working as a tutor and looking for that first lecturing job that will mean she can get *some ongoing support. Now having an Honours student who does that is terrific, and I don't doubt that in the fullness of time she will find full time academic employment.*

This story illustrates the development of a good student in this more traditional field of research, where they are becoming an expert in the field and at the end of their project are seen more as a colleague than a student, gaining acceptance into the academic community. The qualities highlighted are the capacity to drive their own research and the tenacity to complete the research to a high standard.

5.3.4 Traditional performance-based program

A performance based program differs in terms of how the student is required to present their work. They can complete a theory based thesis or alternatively they can base their work on their creative field of expertise. In the second option, students need to create a piece or series of pieces to a high standard and also hand in written work explaining the theory and workmanship behind their creative piece or exegesis.

The Coordinator who comments below is a supervisor with over 10 years experience in the disciplinary field. He explains how student's skills developed in the field of music, using one student who had given a memorable performance in music.

There was this sweet country girl, with long blonde hair, and very thin, and she had a great love for the music of Beethoven. And the difference between the personality of Karen and Beethoven is huge. Beethoven was wild, he was angry, his hair stood up all over the place, Beethoven was one of the most passionate people ever. For her first recital she played the Five Bagatelles, which are one of the quirkiest and strangest bits of music he ever did with sudden loud bits, and quiet bits, and very jokey and tricky, and to be blunt she didn't play them very well.*

So I took her aside after this recital and said 'Karen, if we are going to do Beethoven you have got to understand his character. I want you to become Tiger Karen', I said that quite seriously. Anyway we took this huge risk, and for her second project we let her play the fourth piano concerto of Beethoven, with the orchestra, and write a thesis about it, and boy was it something!

This average sort of recital in the first semester, and then it was indeed Tiger Karen. The piano actually opens the concerto very unusually, you know, your hands are there ready to go, and then 'Boom', and she is off. It was a very exciting performance complemented by a very good thesis analysis of the piece. She is fairly typical of the Honours Music program, you see the transformation of a little wisp of a girl into this amazing tiger pouring our cascades of notes on the Stewart piano with the orchestra in full cry behind her, that tends to happen a lot.

People tend to find themselves throwing off undergraduate inhibitions of performance the more they get into the Honours year - she is the sort of extreme case, and one I will always treasure. I have still got the tape recording of her performance and it is well worth listening to. It has got a few wrong notes but boy has it got passion and zest and fun, probably what it was like in Beethoven's day.

The orchestras Beethoven had to put up with were probably no better than the student orchestra. There is a magnificent mis-hit in the oboe, but her end-of-year performance had integrity, passion and power. It was wonderful to see her come out of her shell. That has happened to a lot of people, though not to anyone quite so dramatically. That is what we are aiming at – to get students to stop being the shy little bunnies that some people are when they are giving their third year recital.

We have an Honours handbook and the Dean, I have already mentioned, wrote it with me and we wrote some criteria for performance and he insisted we put in 'You must seem to own the stage' and that is what they need to do, basically, to own the stage.

In Music or performance-based Honours, the creative performance helps to develop the originality and expertise of the student in their field. The Coordinator identified in this example confidence, self belief and passion as outcomes for the student.

5.3.5 Traditional science-based program

The Science program follows a traditional research training model of master and apprentice. Often faculty members within the science-based disciplines are involved with research grants and can offer scholarships to students to pursue research in their field, as outlined in Chapter Four. Students select the projects and supervisors in their Honours year and for many it marks the beginning of their specialist career.

The following Coordinator interviewed had over ten years experience in supervising research students in undergraduate and postgraduate projects. He remembered one successful student who particularly showed the development of skills in his field.

There is a particular student that I am co-supervising in their research project. And the research project involves a technique that has recently been published in the literature, for doing some remote sensing in near space. It is expensive to sense satellites, so if we do it from the surface it is a bit cheaper. Another group in another country have been pushing in a number of papers over the past few years, a particular way in which this remote sensing is being done. Here [in Australia] we have had one or two doubts.

So we thought what we would do is to propose an Honours project whereby we would have the student investigate. It is interesting because we didn't want to tell the student too much to bias them, but at the same time we had to tell them enough so that they knew where they were working, so it was a little bit tricky. We gave the student specific information to know what the procedure was that was published, then said OK we want to look at this to see if it is actually going to fly or to debunk them.

Now obviously when you tell the student all this stuff at the beginning, some of it goes in and the rest doesn't - we all understand that. This student got hold of the project and painstakingly researched the whole thing. He went step by step checking every assumption and developed the skill of critical analysis, both in the literature and in his own procedures. And assumptions of what he was doing which involved a little bit of mathematical modelling, because in Space Science you have some data but it is not all that comprehensive, because of the expense.

There was some experimental data to fold in to the modeling, and he went through the assumptions of this particular group, and it turns out that the report that is written shows that these guys are perhaps pushing the data a little bit beyond what it actually says. I had actually mapped the project out, assuming that the research showed that we agreed with what had been published, and then there was an extra step to go. When we got to this point, when he actually showed that they weren't quite right, we had to go on a different tack.

Essentially what the student's skills developed into was this reminder that he had to be very careful of what assumptions he had and what other people were saying. Even though it was published literature and accepted by the community as peer review, it may not necessarily be correct and that it may change depending on what further knowledge that we find. He was part of that process.

So, what did he learn? He learnt critical thinking. He learnt to be a little bit skeptical about the published literature. He learnt some of the excitement of disproving an American Theory (you know people who had been in the game a lot longer than him). He learnt that he could actually make a contribution, and that I think was valuable, just by using some fundamental and careful work. And he thoroughly enjoyed the whole process.

At this point he had to write it up and put it out there in the literature. He will have to deal with the referees' comments, the reviewers, the editor and so on. Another skill that he will have to learn is how to justify his position, how to phrase things when replying to reviewers' comments.

Although there are key outcomes overarching the students involved in fourth-year research projects, the experience designed for these students by expert staff is very different. The stories show the diversity of the fourth-year research programs which provide the transition between undergraduate and postgraduate degrees.

5.4 Summary

The Honours year prepares students for further research in their discipline, adds generic attributes for employers and is more cost effective than a two year Masters course. Because it is an undergraduate degree, it is still seen as an important pre-cursor for advancement within the discipline. For professions, students have an extra year to meet requirements imposed by accreditation authorities and to explore a specialty or to strategically align themselves with an employer through their completion of a work-based project designed to apply their knowledge to real life situations.

Key outcomes identified for Honours students in this chapter included curiosity, drive, resilience and having that extra spark. The 'extra spark' was an intangible quality which allowed a student to shine, something which they have had throughout their degree but had not been able to demonstrate through coursework. The development of research skills was also seen as an important outcome for students and developing a broader understanding of the knowledge of their discipline so that they were able to add new and valuable information to the field should they choose to continue on an academic career or within their profession. There was a strong sense in this emergent data that coordinators were nurturing promising research students and celebrating in their successes.

A further in-depth exploration of the development of student skills in different programs demonstrated that there were very different expectations as students become more experienced within their discipline. The stories of how students skills developed from the perspective of the Coordinator differed between programs – from industry-based projects, to a collective view of an emergent profession, to the long career trajectory of a traditional Arts-based field, to the passion required to pursue a performance-based project and lastly the level of expertise required in a science-based field.

They are stories of having ‘what it takes’ to belong in academe. This is the perspective of the disciplinary steward, those who look to build the discipline. They are attuned to what the discipline needs and what qualities academics need to exhibit. The approach focuses on Honours as the testing ground and the take-off point for those who will, in future, best sustain the discipline. They are indeed stories of the coordinator’s personal vindication. Here we really have the culture, what is valued, what is symbolic – the intellectual struggle.

In the next chapter the experience of Honours programs will be explored from a student perspective.

6. STUDENT EXPERIENCE IN FOURTH-YEAR RESEARCH PROGRAMS

6.1. Introduction

This chapter explores the student experience of research in fourth-year undergraduate programs. It provides a general overview of the second phase of the study, the questionnaire, which was distributed to students enrolled in a fourth-year undergraduate research program across a range of disciplines in one site. The chapter is organised into three sections: a general overview of questionnaire data; exploration of the research journey plot and a construct of research preparedness; and interrogation of the data from the questionnaire using three different approaches. The following research questions are addressed in the next four chapters:

5. Are there differences in student personal characteristics between programs? Characteristics considered: gender, age, financial support, nationality, previous qualifications, and whether a break in study.

6. Are there structural differences across programs? Program information considered: percentage of research in the program, research training provided, involvement in industry during the program, membership of a research group, research methodology used

7. Are there differences across programs in environment measures and perceived quality of relationships? Relationships with: academic staff, administrative staff, peers

8. Are there differences across programs in student motivation, self efficacy and intention to continue with research?

9. What are the commonalities and differences across programs in the research journey for fourth-year Honours students undertaking a research project?

10. Can the different types of journeys that students experience within the same Honours program be identified and described?

11. How can the ‘highs’ and ’lows’ along the research journey be measured and compared within an Honours program?

12. What insights can we gain about the manner in which the fourth year Honours research experience contributes to student research preparedness?

The first section provides an overview of the respondents to the questionnaire including: personal characteristics, candidature details, quality of their relationships with peers and staff and their intention to continue with research studies. A number of the research questions arose from the literature, which indicated that students have many obstacles to overcome whilst carrying out research. These obstacles mainly relate to: the isolation experienced by students (Fitzsimmons et al, 2003; Hawes & Flanagan, 2000; Johnston & Broda, 1996; Zuber-Skerritt, 1987); confidence in research tasks, such as developing the research question and collecting data (Todd et al, 2004) and effectively dealing with the large volume of literature (Holbrook, Bourke, Fairbairn & Lovat, 2007; Lovitts, 2007; Hollaway, 2005; Perara, 2005). A sense of belonging to the research environment was also seen as crucial to the transition from undergraduate course-taker to independent researcher (Lovitts, 2001; Kiley & Austin, 2000). Scales assessing student perceptions of their research self efficacy, motivation to undertake research, and support given by the research environment were developed for this study. The student responses to these scales are presented in this section.

The second section provides insight into the experience of conducting research from the student perspective, indicating that there are many highs and lows during the research journey (Kearns & Gardiner, 2006; Vilkinas, 2005; Brause, 2000). Miller & Brimicombe (2003) first described the commonality of process for students conducting research in different disciplines. The researcher has built on this notion by designing a methodological tool to map the initial research experiences of fourth-year research students based on visual representation of the journey. The analysis of the journey plot is further described in this section and different elements are presented which explore the commonalities and differences in the journey within and between programs. Due to the nature of the findings there is also another approach taken in this section, which is to explore a construct of research preparedness. The construct is in the form of a total score, drawing together factors of research self efficacy, motivation, research environment, positivity towards the research journey, relationship with academic staff and intention to continue to further research studies.

The final section of this chapter draws on three different bases of comparison of the data to learn more about the experiences of respondents. Firstly the population was examined in relation to the methods respondents identified in their research project. Secondly, given the emphasis in the literature on the higher completion rates of laboratory-based research students, the population was examined in relation to whether respondents were completing laboratory-based or non laboratory-based programs. Finally the population was examined in relation to the type of fourth-year undergraduate program the student respondents had undertaken. The next three chapters then extend on this final approach, each presenting the findings according to one type of fourth-year program.

6.2 Demographic Information

Almost all the questionnaire respondents were Australian (97%) and most were aged between 21 and 24 years of age (81%). They were full time students (97%) most commonly receiving financial support through part-time/casual employment (54%), government payments (51%), financial support from their family and friends (35%), and from their own personal savings (20%). Only a small proportion of respondents (11%) were supported by a scholarship.

A high proportion of respondents did not have a break in their study before commencing their fourth-year program (88%), and a slight majority did not intend to continue on to a higher research degree (54%). Only a small proportion of students specified the intention to continue on to a higher research degree (14%), the remainder indicated they were unsure (32%).

In terms of their research project, most respondents had contact with their industry or profession (73%) and considerable involvement in their choice of topic for their project (72%). Most respondents were not involved in a research group (65%). The facilities required for fourth-year research students from their perspective were a computer laboratory (56%), a workplace (54%), and a science laboratory (23%). Most students indicated that their faculty provided them with some of the resources required to conduct research, and just under a third believed that they were relatively well-resourced (31%). Most respondents had one supervisor (88%) and well over half the total supervisors were male (61%).

The majority of respondents were from the School of Education (57%), which had the largest number of students in their fourth-year undergraduate research course. The questionnaires for Education were completed at a different time to the rest of the Honours groups, i.e. not at the end of their project, due to the difficulty in accessing the cohort at the end of their Teacher Research Project when they were on their teaching internship off-campus. To take account of this difference, the data are principally reported by Faculty or School. The next largest groups of respondents were from the School of Engineering (16%) and the School of Environmental and Life Sciences (10%) (see Table 9).

Table 9: Frequency of Responses to Discipline Enrolled during Fourth-Year (n=295)

Faculty	Disciplines	Frequency	Percent	Percent Faculty
Education	Education	169	57	57
Engineering	Engineering	47	16	20
	Architecture and Built Environment	12	4	
Sciences	Environmental and Life Sciences	28	10	14
	Mathematics and Physical Sciences	6	2	
	Biomedical Sciences	5	2	
Arts	Design and Communications	9	3	9
	Humanities & Social Sciences	19	6	

The sample is imbalanced with respect to gender. Education and Arts both have high proportions of female students, and Engineering has a very high proportion of male students (see Table 10).

Table 10: Cross Tabulation of Faculty and Gender (n=295)

	Male	% within faculty	Female	% within faculty	Total
Faculty					
Education	40	24%	129	76%	169
Arts	7	25%	21	75%	28
Engineering & Built Envt	50	85%	9	15%	59
Sciences	18	46%	20	54%	39
Total	116	39%	179	61%	295

Contact with Supervisor was indicated as High (daily or weekly), Mid (fortnightly), or Low (monthly or less). Students in most Faculties had a high level of contact with their supervisor/s, particularly respondents in the Sciences (82%), the exception being Education in which the majority of respondents had a low level of contact (63%) or 'Other' (19%) which indicated on the whole that they only met their supervisor/s 'when needed' (see Table 11).

Table 11: Cross Tabulation of Faculty and Contact with Supervisor (n=284)

	High Contact	Mid Contact	Low Contact	Other (When required)	Total
Education	17	11	102	31	161
Arts	15	11	1	0	27
Engineering & Built Envt	33	14	10	0	57
Sciences	32	4	3	0	39
	97	40	116	31	284

Respondents were asked to indicate how much expertise their Supervisor/s had in their area of interest, with scores ranging from 'none' (scored as 1) to 'a lot' (scored 3). The mean scores for each group are shown in Table 12. Faculties where respondents felt they had more supervisor expertise in their area of research were in the Arts and Sciences. Students in Education felt their supervisor had little expertise in their area of research, and these students also had a low level of contact with their supervisor.

Table 12: Supervisor Expertise Mean and Standard Deviation by Faculty

Faculty	Mean	Standard Deviation
Education	1.22	0.83
Arts	1.93	0.27
Engineering & Built Envt	1.79	0.53
Sciences	1.87	0.47

6.3 *What project methods did students use?*

Respondents were asked to indicate what type of research they were conducting, and specifically what methods were being used. In answering this question, students could tick any of the categories listed, or if a method was not included, could tick a box called 'Other' and write a description of the method next to the box. Respondents could tick more than one box to describe the methodological approach they were using.

The frequency of research methodologies utilised in their research design by students located in different Schools is shown in Table 13. The most nominated method named by respondents was Observation, with 46% of respondents choosing it as part of their methodology for their project, followed by Qualitative (42% of respondents) and Experimental (32% of respondents). The least nominated methods for the cohort were Philosophical (5% of respondents) and Exhibition (2%). This may be reflective of the small numbers of responses to the questionnaire received from Arts students. The 'Other' category has not been used in the analysis as most of the respondents did not add the detail when they ticked the box.

Table 13: Frequency of Project Methods by School (n=271)

	Document Analysis	**Fieldwork**	**Focus Groups**	**Interview**	**Observation**	**Qualitative**	**Experimental**	**Laboratory Work**	**Quantitative**	**Survey**	**Statistical**	**Philosophical**	**Exhibition**	**Other**	**Total**
Education	28	38	21	27	89	62	12	2	29	73	17	7	3	4	**412**
Engineering	17	12	1	5	21	15	38	31	18	2	10	0	2	8	**180**
Environmental & Life Sciences	5	2	4	0	10	14	27	23	17	1	11	1	1	1	**117**
Humanities & Social Science	6	1	3	3	5	11	2	0	8	7	1	2	0	2	**51**
Architecture & Construction	3	0	0	2	2	7	1	0	4	3	2	1	0	0	**25**
Design, IT & Communications	4	1	1	2	2	5	2	0	1	1	1	1	0	2	**23**
Biomedical Sciences	0	0	0	0	0	1	5	5	3	0	4	0	0	0	**18**
Maths & Physical Sciences	1	0	0	0	1	3	2	1	2	0	0	1	0	2	**13**
Total	**64**	**54**	**30**	**39**	**130**	**118**	**89**	**62**	**82**	**87**	**46**	**13**	**6**	**19**	**839**

The type of methodologies applied to the research project is based predominantly on the discipline. Education students tended to favour the types of methodology which would be suitable to carry out at their school-based site, nominating observation (22%) and survey (15%). Engineering students on the other hand, nominated experimental (21%) and laboratory-based (17%) methods, similar in preference to students from the Environmental & Life Sciences.

6.4 *What was the quality of relationships?*

The Quality of Relationships Scale consisted of three items, developed to gauge how students related to different members of their learning community. The three items which contributed to this scale were the Quality of Relationships with Peers, The Quality of Relationships with Academic Staff and the Quality of Relationships with Administrative Staff.

The scale was presented as items where the respondent was asked to indicate on a six-point Likert scale the quality of their relationship with different groups of people, from 'Not at all Helpful' (1) to 'Extremely Helpful' (6). A score of 3.5 on such a scale indicated neither agreement of disagreement. There was also an option for respondents to indicate that the item was 'Not Applicable', however, no one opted for that response.

Table 14: Quality of Relationships Scale characteristics (n=287)

Quality of Relationship Items & Scale	Mean	Standard Deviation	Reliability
Peers	5.20	0.9	
Academic Staff	4.60	1.0	
Administrative Staff	4.22	1.2	
Quality of Relationships Scale	4.68	0.8	0.56

As shown in Table 14, on the whole students related most positively towards their peers during the research project, with the mean falling between 'helpful' and 'extremely helpful'. For Academic and Administrative Staff, the means fell between 'a little helpful' and 'Helpful', with the relationship with Academic staff being slightly more positive. Overall, students found both peers and staff helpful in their undergraduate research studies. The Quality of Relationships scale reliability with a Cronbach alpha coefficient of 0.56 was disappointing, but was related to a ceiling effect of two of the three items forming the scale.

6.5 Were the students motivated?

Motivation was explored in this study through a series of 13 statements which contributed to the scales of Intrinsic Value, Self Regulation and Cognitive Strategy Use. See Appendix 6 for details of scale development including the individual item factor loadings.

For scales used in this study (as discussed in Chapter Three) the respondent is asked to respond to a series of statements by indicating on a six-point Likert scale the extent of their agreement with each item, from Strongly Disagree (1) to Strongly Agree (6). This applies to all scales. A score of 3.5 on such a scale indicates neither agreement of disagreement.

Table 15: Learning Motivation scale characteristics (n=287)

Scale	**No. of Items**	**Mean**	**Standard Deviation**	**Scale Reliability**
Intrinsic Value	4	4.82	.71	0.76
Self Regulation	5	4.29	.76	0.65
Cognitive Strategy Use	4	4.54	.63	0.58

Students were on the whole motivated to complete their fourth-year research project, with all means falling between ‘tend to agree’ and ‘agree’ as shown in Table 15. The agreement was strongest for Intrinsic Value (4.82). The student perceptions of their self regulation and cognitive strategy use were also positive, suggesting that as a group they were determined to see the project through and felt they could meet the intellectual challenges. The scale reliability for Intrinsic Value was very satisfactory, although the Cognitive Strategy Use scale was not as reliable with a low alpha coefficient.

6.6 Were the students confident?

Student confidence in research tasks was addressed through 20 statements which contributed to four stage-based scales of Conceptualisation, Early Tasks, Implementation, and Presenting the Results.

Table 16: Research Self Efficacy scale characteristics (n=280)

Scale	No. of Items	Mean	Standard Deviation	Reliability
Conceptualisation	5	4.37	.74	0.83
Early Tasks	5	4.34	.78	0.85
Implementation	5	4.23	.83	0.87
Presenting the Results	5	4.25	.84	0.86

As evidenced in Table 16 the results were positive overall, with all means falling between 'tend to agree' and 'agree'. The agreement was slightly stronger for the Conceptualisation and Early Tasks phases, indicating that students were slightly more confident in tasks such as brainstorming ideas for the literature and generating researchable questions, but the difference was minimal. Students on the whole still tended to be confident with the tasks such as collecting data and presentation of findings. The reliabilities of all Research Self Efficacy scales were high.

6.7 Did the research environment support students?

The research environment consisted of two scales, developed from the literature on the experience of undergraduate researchers (See Appendix 6). The two sets of items reflect Learning Community and Research Support, and consisted of a series of 11 statements.

Table 17: Research Environment Scale characteristics (n=287)

Scale	No. of Items	Mean	Standard Deviation	Reliability
Learning Community	6	3.92	.81	0.73
Research Support	5	4.31	.69	0.56

As shown in Table 17, students tended to be positive about Research Support (4.31), with the mean falling between ‘tend to agree’ and ‘agree’. This indicates that they felt they had a positive research environment, in terms of access to resources, services and networks on campus. Students were less positive about their connection with the Learning Community (3.92) of the university. The mean falls closer to ‘tend to agree’ indicating that, as a group, the students felt more ambivalent towards the academic community supporting the research project, however, they tended toward the positive. Given that research suggests this area is important in the research process (Johnston & Broda, 1996; Hawes & Flanagan, 2000; Lovitts, 2005), it is an area that could be targeted to improve the experience of these undergraduate researchers. This will be further discussed in Chapter Ten. The reliability of the Learning Community scale was satisfactory, although the Research Support scale was less reliable with a low alpha coefficient.

6.8 How did students experience the research journey?

The notion of the journey is one which is emerging in current research practice. Simple visual representations are being used as tools for students to identify the highs and lows of their research experience. Drawing on a quantitative approach, different paths and factors which positively influence the student’s journeys were identified. A method was developed to quantify the journey across the different terrains, exploring research understandings and intensity of feelings towards research. Visualisation of the journey is increasingly being used as a reflective tool, particularly in postgraduate research literature (see Chapter Two). However, there has been no attempt to develop quantitative measures of journey plots that allow journeys to be compared across individuals and groups.

Of the 295 respondents, 162 respondents (55%) completed this item on the questionnaire. This may suggest a sub-group with particular characteristics elected to complete this section of the questionnaire. The different shapes of the journey plots that were recorded, however, suggest that there were large differences in their dispositions towards the research project. In general, the journey plot provides a way for students to identify through visualisation the high and low points in their research journey at the time of doing the questionnaire (marked by an X) and how they anticipate the journey will proceed and conclude. Thus it shows how the students see their progress to date and what they anticipate for the remainder of their research journey. The plot is used initially to provide richness and context to the quantitative data as previously described in this chapter. The plot gives a subjective impression about how each candidate feels at the start and end point of their project. Because the journey is contained within a grid with an axis at the mid-point representing neutral feeling it is possible to represent the range of positions nominated by candidates.

Table 18: Research Journey - Summary of plot positions at start and finish

Type of Plot	Frequency	Percent
Neutral start, Positive finish	41	25
Neutral start, Neutral finish	27	17
Neutral start, Negative finish	4	2
Negative start, Positive finish	40	25
Negative start, Neutral finish	9	6
Negative start, Negative finish	10	6
Positive start, Positive finish	24	15
Positive start, Neutral finish	5	3
Positive start, Negative finish	2	1
Total	**162**	**100**

Journey types were based on two dimensions – positivity/negativity and start/end points. It transpired there were nine types of Journey Plots (see Table 18). Only 19% of students who completed the Research Journey Plot started the journey with a positive disposition. Most students started their journey with a neutral (44%) or a negative (37%) disposition. No matter how the plot starts, the most common finish of the plot is positive (65%), demonstrating that overall students feel positively, or in the case of Education students anticipate they will feel positively, about the project at its completion. Furthermore 17% of those who started at the neutral level ended at that level. This does not necessarily mean they had a smooth project, and the journey is contextualised by what lies in between.

6.8.1 Comparative journeys for types of programs

While each journey plot is highly individual, the grid allows comparison in key areas: the start and finish positions, the nature of the items labelled, the number of positive and negative peaks and the overall pattern of peaks. By determining the mean height and number of peaks (positive and negative) it is possible to visualise the average journey (see Figure 7).

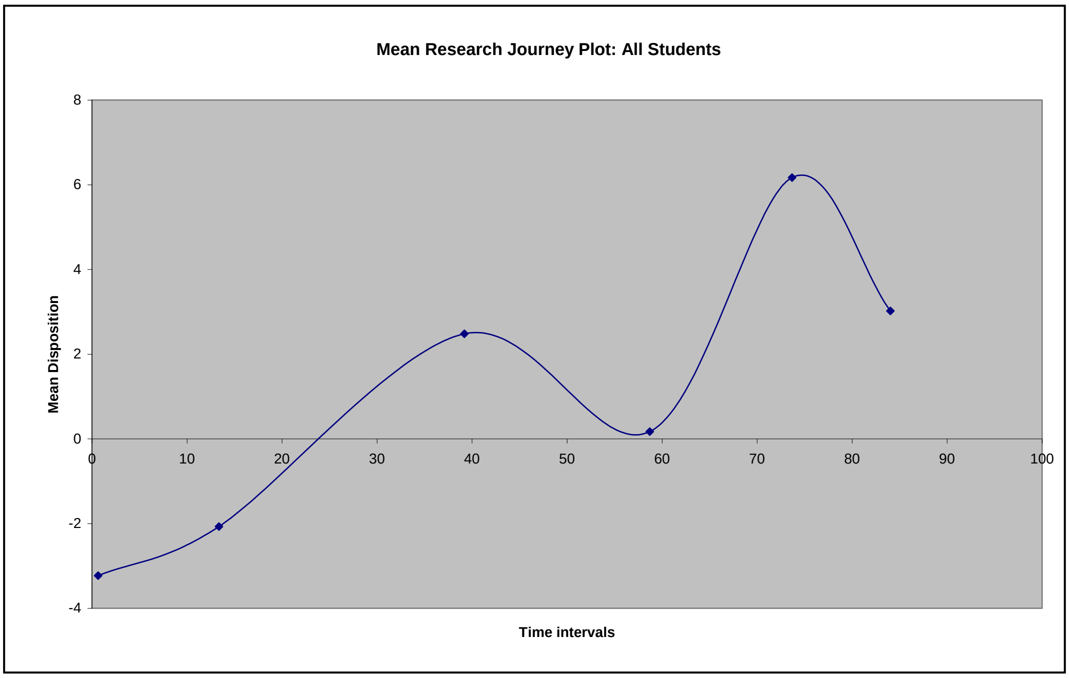

Figure 7: Mean Research Journey Plot for All Respondents

The average plot almost has a balance of high and low points, although most of the journey is in the positive sector (above the axis). This is very encouraging for both students and staff, particularly in the balance of the ups and downs as students experiencing a low in their research can usually be assured that a high will follow.

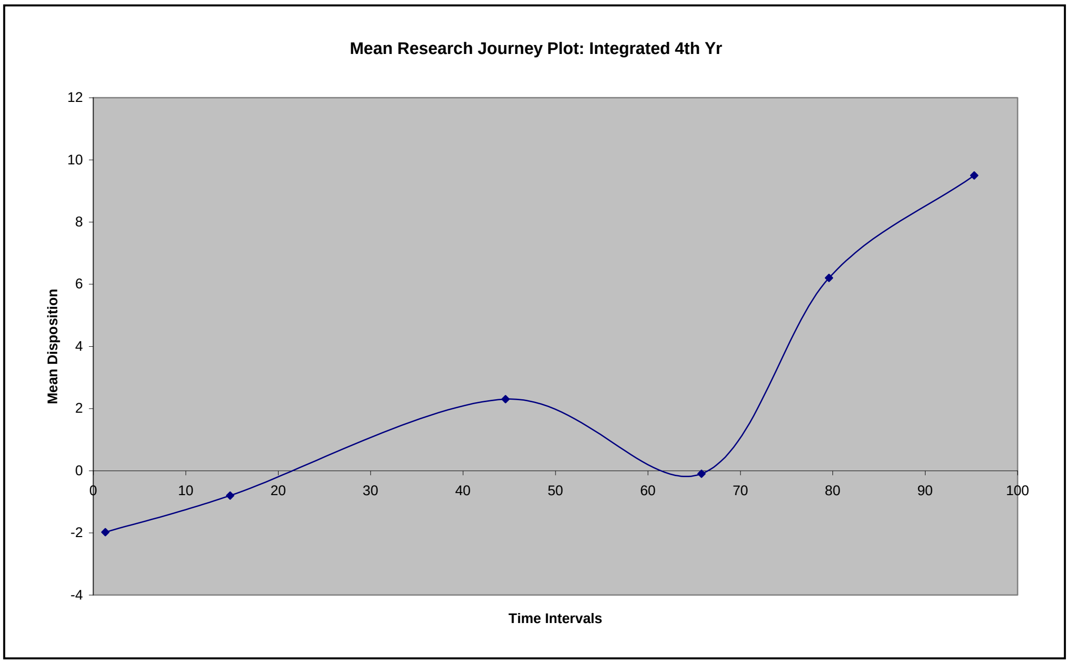

Figure 8: Mean Journey Plot Embedded Programs (excluding Education)

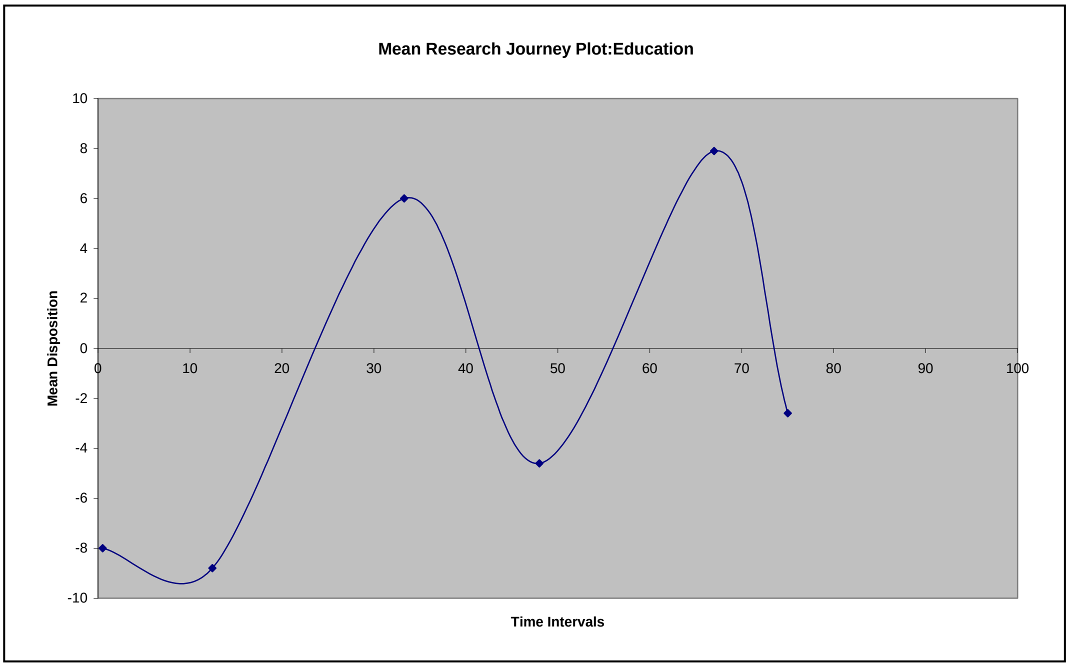

Figure 9: Mean Journey Plot Teacher Research Projects

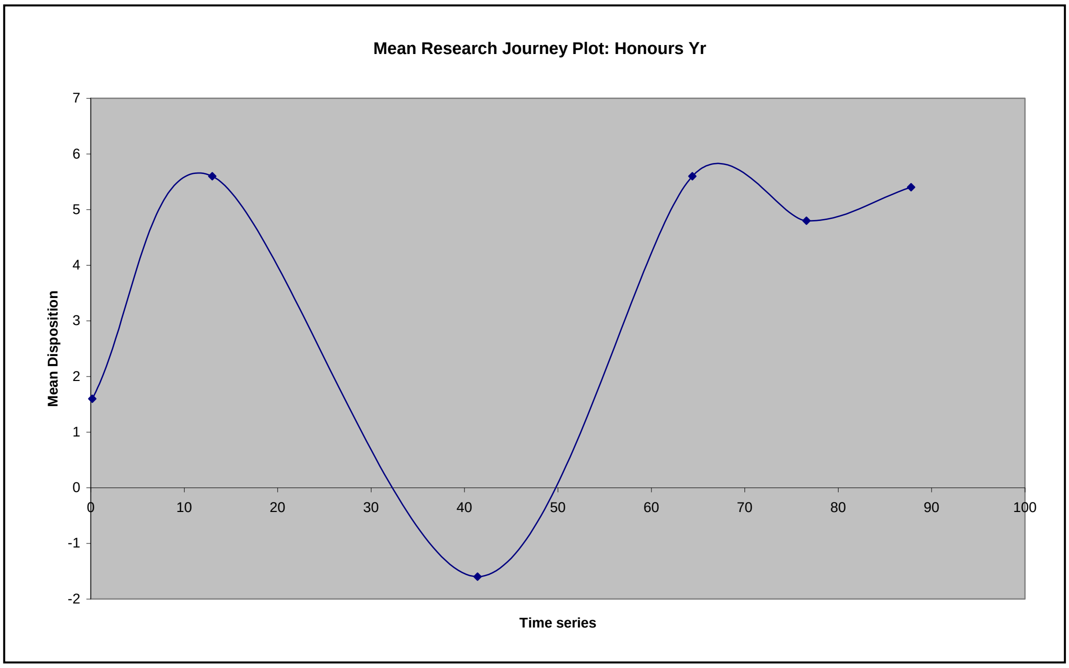

Figure 10: Mean Journey Plot End-On Programs

The respondents in different types of fourth-year research programs visualised their journeys in different ways and, as such, showed they had different research trajectories as demonstrated in Figures 8, 9 and 10. On average, the only group who started with a positive disposition was the End-on Honours students (see Figure 10), with the Education student group experiencing the most negative start to their journey (see Figure 9).

6.8.2 What were the elements of the research journey?

A number of elements of the instrument were identified to explore these commonalities and differences of the journey across and within programs (such as duration, complexity, intensity and impact). These are now described.

6.8.2.1 Duration

The length of the journey along the horizontal or x-axis was referred to as Duration, using a scale of 0 to 100. A starting point was identified by the use of the word 'Start' and a suggested end point was identified as 'Submit project for examination' towards the end of the x-axis or journey line, as shown in Figure 11.

Some opportunity was provided for respondents to continue the plot line beyond the submission point.

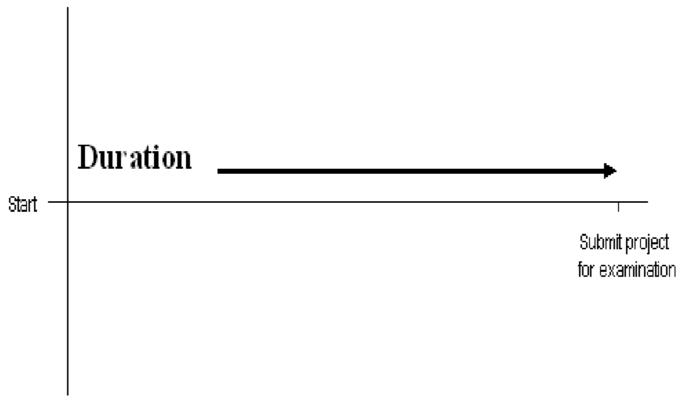

Figure 11: Illustration of Duration on the Journey Plot

The *Duration* was indicative of either a reflection of the journey to conclusion or the journey to date plus a prediction of the journey to come. Respondents were asked to indicate where they were along their journey at the time of completing the survey, by marking the line with an ‘x’. This indication was not given by many of the respondents. Knowledge of the timing of data collection for each faculty, however, is a guide here. Data were collected in the middle of the journey for Education students, and as such the measure has both a reflective and predictive aspect. For all other respondents, data collection was at the end of their project, i.e. post submission, making the plot entirely reflective.

Those respondents with the longest plots along the x-axis were in the Schools of Environmental and Life Sciences and Mathematics and Physical Sciences, which were past the indicated ‘submit project for examination’ label (see Figure 12). This may be because, for these respondents, experience with the project continued after submission, particularly as these laboratory-based programs were more oriented towards the research team and in some cases were part of a larger research project within their discipline. Respondents from other Schools all had journeys around the 100 length, excepting respondents in the School of Education whose journeys were shorter in duration indicative of the collection of data from education before project completion.

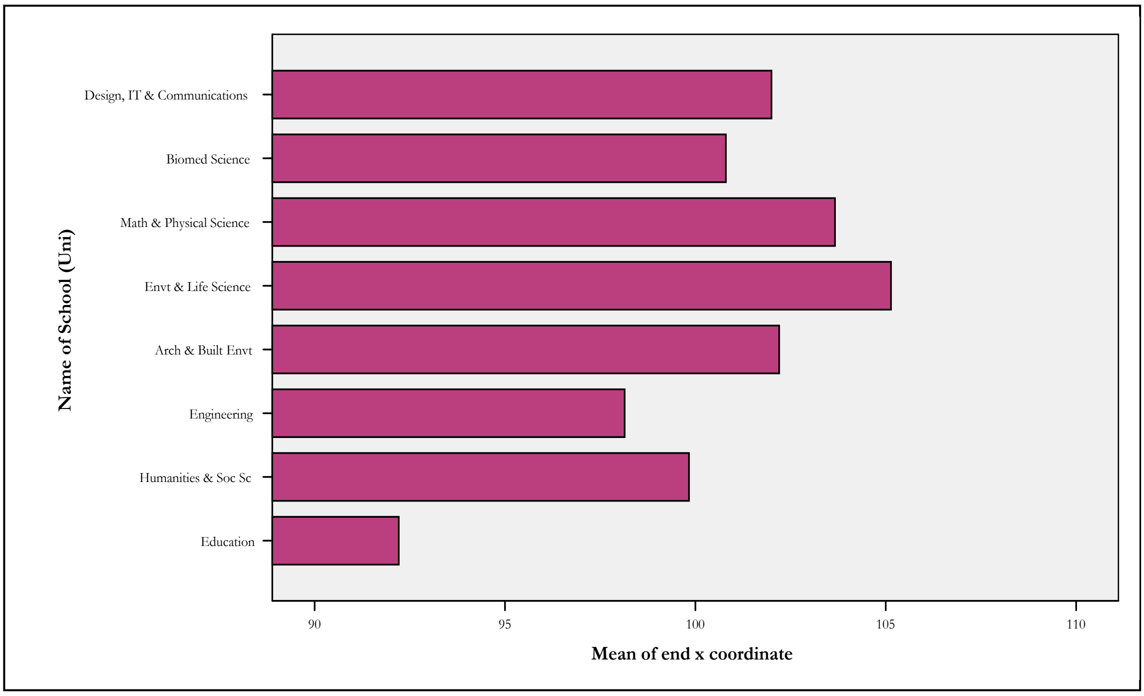

Figure 12: Duration of Journey by School

6.8.2.2 Complexity

Complexity was defined as the number of phases which occurred throughout a nominated journey. A new phase occurred every time the neutral journey line was cut by the path drawn by a respondent, as shown in Figure 13. This measure gave an indication of the level of complexity of each journey and the respondent's perception of how smooth the road was. Disposition refers to emotional highs and lows, some associated with specific events. Having a high level of complexity meant that there were many events experienced during the research journey which elicited either positive or negative emotion from the respondent.

Complexity was assessed by calculating the number of peaks, whether high or low. For example for the plot below there were four peaks and therefore four phases.

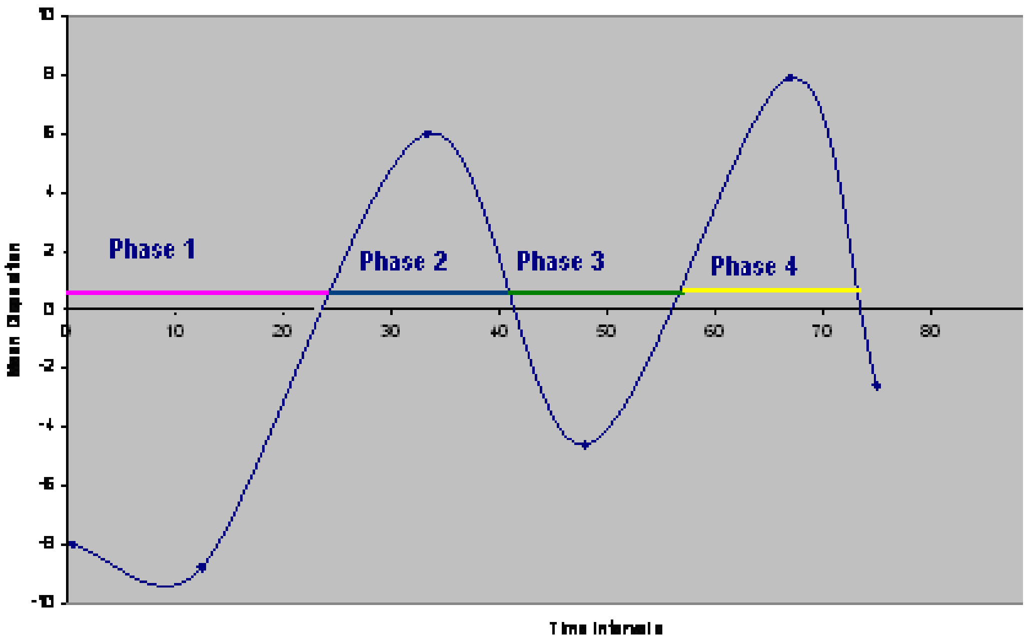

Figure 13: Illustration of Complexity on the Journey Plot

Respondents with the most complex journeys were from the School of Biomedical Sciences, followed by those from the School of Design, IT & Communications. Both of which had an average Complexity of more than six phases (see Figure 14). Respondents depicted with the least complex journeys were from the Schools of Engineering and Architecture and Built Environment.

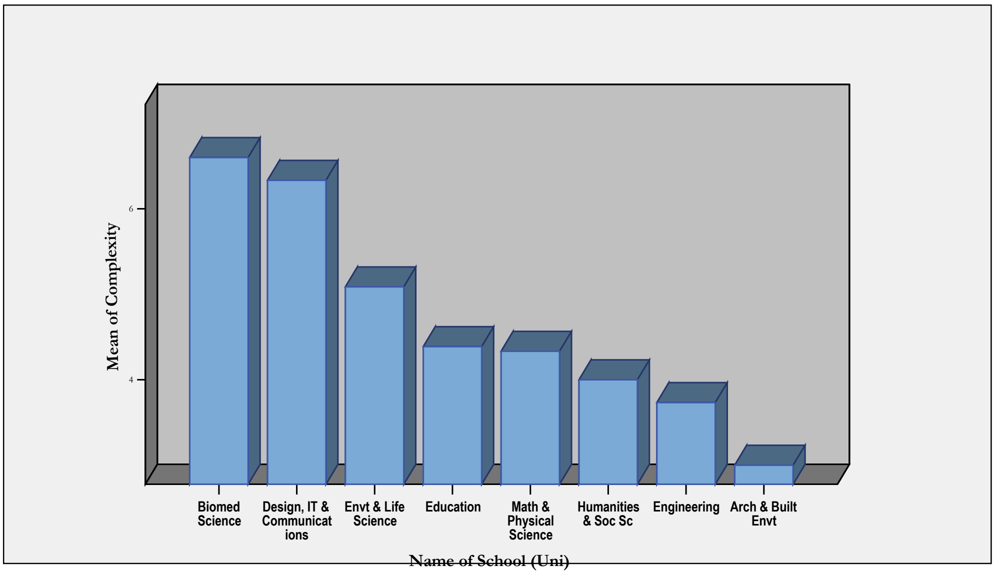

Figure 14: Average Complexity of Journey by School

6.8.2.3 Events

The path drawn was unique to each respondent, as were the labels used to describe the nature of their highs and lows. These labels are referred to as Events in the student's journey. The labelling of Events along the path was open-ended. These events were analysed using qualitative processes, based on the literature and other scales used in the questionnaire. The two different categories were derived from the data, dependent on whether the comment was related to the specific task being undertaken or to a more personal experience of research. Table 19 shows the codes that capture all the events respondents noted on their journey plot.

Table 19: Codes that capture all the events respondents' noted the Journey Plot

Task-related Events	Personal Events
Research topic	Feelings
Research question	Expectations
Literature	Progress
Research proposal	Motivation
Ethics	Resource Support
Data Collection	Learning Community
Data Analysis	
Writing	
Completion	
Coursework	

6.8.2.4 Intensity

Intensity was measured by position in relation to the vertical or y-axis, that is, distance from the neutral horizontal line (see Figure 15). Intensity gave an indication of the strength of the feeling towards each event nominated by the respondent.

Figure 15: Illustration of the measure of Intensity

The level of intensity (value of y) was linked to the coded event allowing a comparison to be made among respondents of how strongly they felt about the specific events identified in their plot relative to other events they noted. Figure 16 shows the strength of the feelings respondents had with Task Related Events. The respondents were overall most positive about completing their project (+19), and were on the whole also positive about conceptual tasks such as formulating the research questions and research topic. Respondents were also positive about tasks involving data, such as Data Collection and Data Analysis. Tasks which resulted in an overall negative intensity included the Research Proposal (-5), Ethics and Writing up the project. Interestingly, the tasks related to literature within the journeys were neutral, being balanced between the positive and the negative levels of intensity (0).

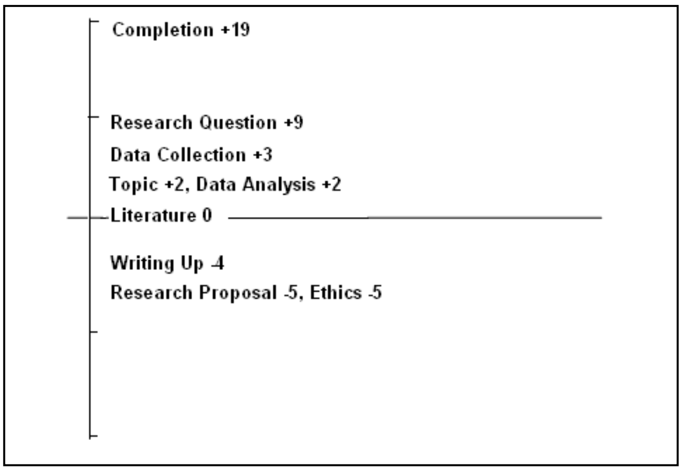

Figure 16: Intensity of task-related events on the overall journeys

The Task Related Events had a stronger response than the Personal ones, as shown in Figure 17, which on the whole were balanced between the positive and negative levels of intensity. This was particularly so for events indicating Progress within the research project and Motivation towards the project. The only negative measure of intensity for a Personal Event was in terms of Expectations about research, which only were slightly negative on the scale (-2).

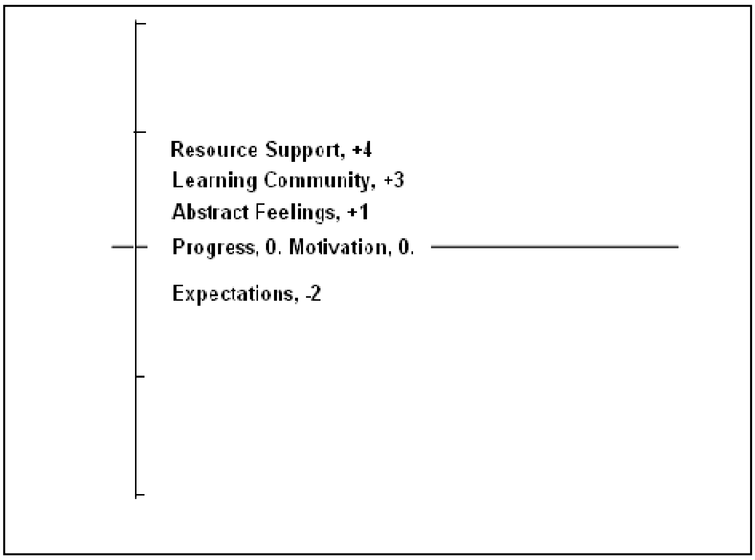

Figure 17: Intensity of personal events on the overall journeys

6.8.2.5 Impact

Impact represented the amount of emphasis given to a nominated event compared to other events along the journey (see Figure 18). Impact meant the positive or negative nature of the specific experience and gave an indication of the degree of impact the event had on the student's journey.

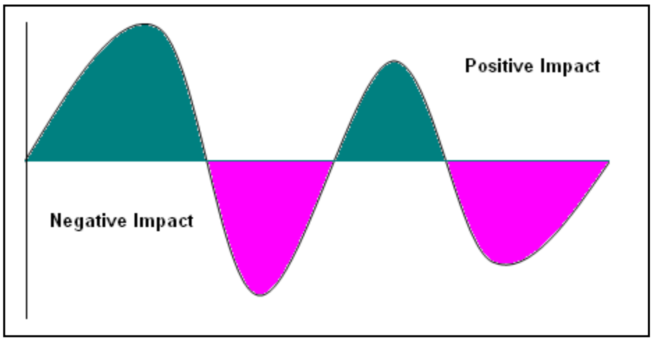

Figure 18: Illustration of the measure of Impact

This provided a powerful representation of what impact each type of event had on the student's perception of their experience. When the measure of Impact is combined with the coding of each event, the comparison of the events across different types of journeys is possible.

The events which impacted on the research journey were categorized into personal and task related events. Events could have both a personal and task related component, for example a comment such as 'feeling very unsure about the value of my research topic' (n170) is related to the task of the research topic, however, also has a personal element involving expectations during the research process. The respondent has identified that they realised the topic needed to add value to their field, however, felt they are not meeting the expectation at that point of the research journey.

The impact of personal events on the journeys of respondents was explored (see Figure 19). Feelings and expectations about research experienced along the journey had a negative overall impact for students. Examples of negative comments included 'feeling overwhelmed' (n236), 'seeing depth & difficulty of concepts' (n215) and 'very bored' (n189). Also comments identifying progress related to the research, when identified by respondents on the whole, had a negative impact on the journey. These included comments such as 'slow start' (n225), 'submission rejected' (n15) and 'left things too late' (n278).

The overall motivation to complete the research project was positive, as was the overall impact of the learning community on the journey. The event which positively impacted most on the journeys, however, was the provision of resources to enable students to carry out their research project. Examples of comments included 'found literature needed in library' (n196) 'thesis writing in Honours laboratory' (n212) 'completing work with specialised equipment' (n164). These events were predominantly identified as high points on the journey plot overall.

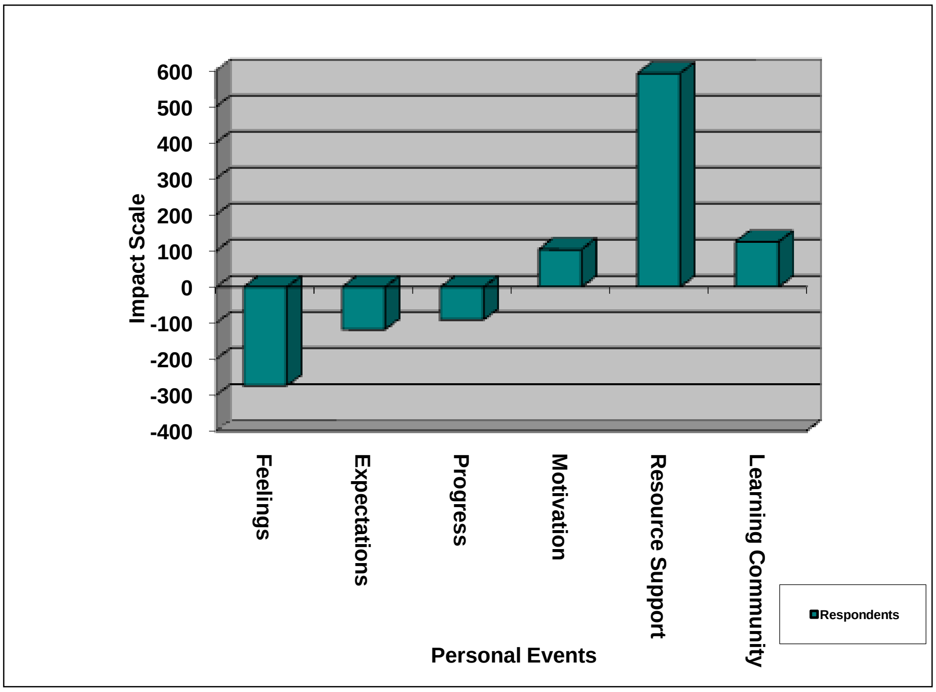

Figure 19: Impact of personal events on overall journeys

In terms of the research tasks which impacted on the overall journeys, the tasks which had the most negative impact were the topic, research proposal and ethics (see Figure 20). Examples included 'not sure what to do for research proposal' (n83), 'couldn't think of a question or area' (n86), 'options not narrowed down and ideas not expressed clearly' (n26), and 'stuffed around by ethics committee' (n203). The other item which made a substantial impact on the journey, in a negative sense, was coursework. Examples included 'Task 1 due … too much irrelevant work on top of scheduled coursework (n38) and 'lit review due in middle of exam time. No time to do it.' (n38). This related to the fact that a lot of the students had competing demands on their time within the fourth-year programs, and supported results from other studies (Todd et al, 2004) where students experienced difficulties with juggling competing demands.

In terms of positive impact on the journey, the research proposal and data collection were seen as events which had a positive influence on the journey. Completion was also clearly an event which influenced the journey positively, although given that the feelings associated with completing a task were often euphoric, it could be false positive. Students had not received their grades for the research project, for example, when they completed the journey plot.

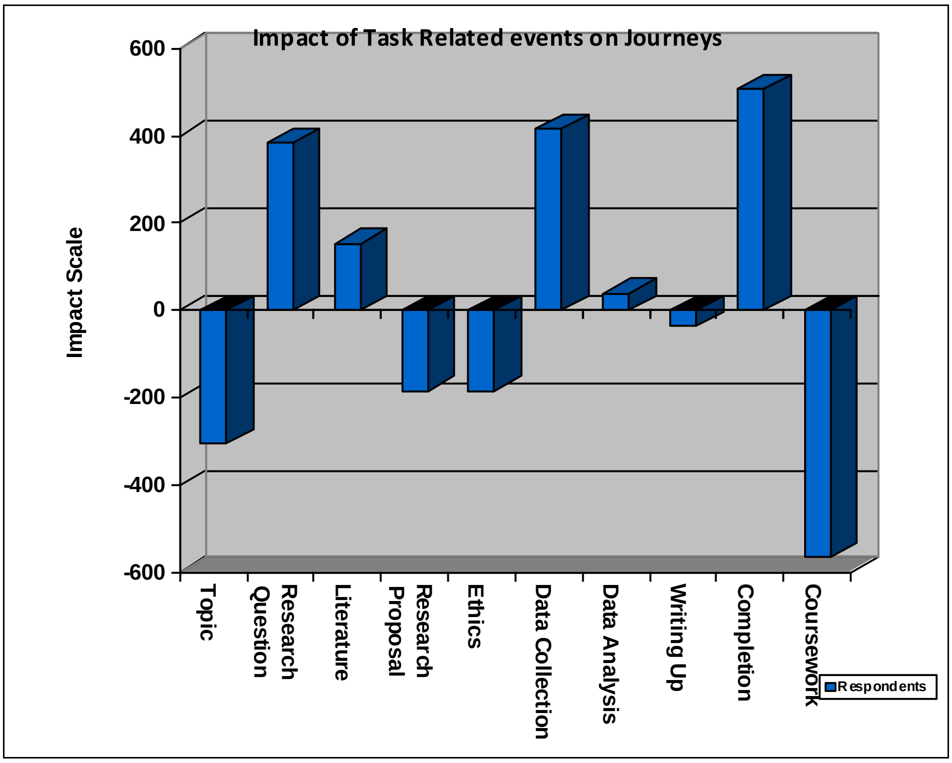

Figure 20: Impact of task-related events on overall journeys

Aspects of the beginning research experience pointed out in the literature are, in the main, the learning approach towards research projects, the confidence students have in carrying out research tasks and the research environment in which the student is placed. In this section the experience of research was explored in greater detail, giving more insight into the highs and lows students experience depending on their unique journey. Through exploring the elements of a visual journey plot, commonalities and differences in the journey can be found for students completing their research project. Johnson & Broda (1996) identified a need to investigate how better to prepare students to carry out higher degree research, and this question has gained impetus given the recent reviews in higher education both within Australia and globally (Bradley et al, 2008; Boyer, 2000). In the next section different aspects of the student experience were investigated to explore the concept of research preparedness and to consider a possible construction of a measure of research preparedness.

6.9 How prepared were students to continue on to further research?

A Research Preparedness Score (RPS) was developed, composed of the scales already reported in this section. It is clear that regardless of the type of research program offered, students were motivated and had a sense of self efficacy about the process of doing research. The research environment had an effect on the process of research, with resources and supportive peers and staff influencing the student experience. In particular, the relationship with academic staff was identified as a key factor in recruitment of Honours students and was identified as the strongest relationship for respondents as a whole. The journey plot has shown the importance of a positive start, particularly for the group of End-on Honours students, who also had the strongest intention to continue on to further research studies.

Respondent scale scores were first factor analysed to determine whether they would form an overall measure of Research Preparedness with satisfactory construct validity. The factors and item loading are shown in Appendix 6. The 12 potential items of the Research Preparedness Score (RPS) were subjected to a principal components factor analysis (PCA). Prior to performing PCA the suitability of data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of 0.3 and above. The Kaiser-Meyer-Oklin value was 0.88, exceeding the recommended value of 0.6 and the Bartlett's Test of Sphericity reached statistical significance, supporting the factorability of the correlation matrix. PCA revealed the presence of four potential factors with eigenvalues exceeding 1, explaining 44.6%, 11.1%, 9.1% and 8.8% of the total variance respectively.

The relative dominance of the first factor and the desire to represent the items in one scale led to the testing of a single-factor solution. The results of the single-factor solution (shown in Table 20) support the creation of a single scale. The RSE scales were the most important measures for Research Preparedness, and the Start Point of their Journey the least important, with all other measures between these two extremes. The scale also has a strong internal consistency, with a Cronbach alpha coefficient of 0.867.

Table 20: Research Preparedness Score – Factor Analysis

Item	Component 1 Research Preparedness
Research Self Efficacy - Early Tasks	.897
Research Self Efficacy - Implementation	.871
Research Self Efficacy - Presenting Results	.865
Research Self Efficacy - Conceptualisation	.865
Research Envt – Learning Community	.654
Motivation – Cognitive Strategy Use	.644
Motivation-Self Regulation	.637
Research Envt-Resource Support	.593
Motivation-Intrinsic	.533
Intention to Continue Research	.406
Relationship with Academic Staff	.389
Positive Start	.300

The responses to the scales contributing to Research Preparedness were weighted by the factor loading then added, to represent the new measure as a weighted total score. The scales were grouped into four areas:

Research Self Efficacy	Conceptual, Early Tasks, Implementation, Presenting Results
Motivation	Intrinsic Motivation, Self Regulation, Cognitive Strategy Use
Research Environment	Learning Community, Research Support
Research Orientation	Intention to Continue, Relationship with Academic Staff, Positive Start to the Research Journey

The means of each of these scales were summed to compute a weighted total score for each respondent. The total score had a minimum value of 6 and a maximum value of 21, with an overall mean of 15.80 (SD 2.0). This indicated that, as a whole, students generally exhibited research preparedness. Gender made a significant difference to a student’s perceived preparedness for research, with male students having higher research preparedness scores than their female counterparts (see Table 21).

Table 21: Comparison of Means: Gender and RPS

Student Characteristics			RPS		
		N	Mean	Standard Deviation	T-Test and probability
Gender	Male	108	16.32	(1.7)	t=3.56, p=0.000
	Female	172	15.47	(2.1)	
	Total	280	15.80	(2.0)	

The measure of Research Preparedness signified that students felt well placed to continue on to future research. Although it could be argued that simply the process of 'doing' research sets you up to do more (Winn,1995) and that a supportive research environment is important in making the transition to being a producer of knowledge (Lovitts, 2001), the measure of research preparedness suggests that it takes more than that to be prepared for research. The right learning approach is also required along with a positive orientation towards the research journey.

6.10 Exploration of data using different approaches

Due to the nature of the findings, the data will be investigated in this section using three different approaches. Firstly, the data will be explored in terms of the type of methodologies utilised by respondents in their research project. The second approach will investigate laboratory-based and non-laboratory based programs. As previously mentioned, these different types of program have been found to influence timely completion in doctoral education (Sinclair, 2005; Wright & Cochrane, 2000; Seagram et al, 1998; Bowen & Rudenstein, 1992) and have been found to be a factor in a higher intention to continue to postgraduate research (Mullins, 2006). Finally the data will be explored in terms of the three categories of fourth-year research program.

6.10.1 Comparison using research project methodology

The methodology the students were using in their project was considered to be a potentially important variable in the examination of the student responses to the questionnaire data. There are no studies to draw on from the literature which explore student experience in fourth-year using different project research methodologies as a factor, consequently the information below arises from exploratory analyses.

Characteristics about respondents who either conducted a quantitative or qualitative based study will be further explored in this section, in relation to their personal details, candidature, program and their experience of research. The numbers of students in each category is comparable, with 117 (43%) respondents nominating quantitatively-based methods and 106 (39%) respondents nominating qualitatively-based methods. A small number of respondents nominated measures that were unable to be identified as they were in the 'Other' category or were not identifiable as quantitative or qualitative methods (16%). However, these will not be included in the comparison which will be restricted to the two contrasting research approaches.

Respondents were mainly Australian full-time students aged between 21 and 24 years of age. Of the students using quantitative methods 51% were female, whereas the qualitative 68% were female. The majority of students using quantitative methods were based in the Engineering (30%) and Environmental & Life Sciences (18%) disciplines. Of those in Education, 70% were using qualitative methods.

The respondents completing qualitative based studies on the whole had contact with the profession (77%), however, for the majority the research undertaken did not involve a research group (77%). Students perceived that they had a lot of involvement in the choice of topic for their project (81%), and did not have a high level of contact with their supervisor. They predominantly had one supervisor (92%), with an almost even balance between male (52%) and female (42%)

gender of supervisor. The majority of the respondents perceived that their supervisor did not have a lot of expertise in their area of study (57%).

The respondents carrying out quantitative-based studies also had high contact with the profession (70%). Given that more also had a higher contact with a research group (44%) during their research project, there is an indication that these students were more connected to a learning community. The majority of the respondents saw their supervisor on a daily or weekly basis, although they too perceived their supervisor did not have a great deal of expertise in their area of research (73%). Respondents nominating quantitative methodologies predominantly had one supervisor (86%), with a greater proportion of male supervisors (77%) than female supervisors.

Respondents completing a quantitative-based study were more likely to have an intention to continue on to research postgraduate degrees (19%) as opposed to those completing a qualitative-based research project (9%). There were, however, a similar number of students who were unsure about whether they would continue on to higher degree research studies (34% of qualitative-based and 33% of qualitative-based approaches). This is a large group of students to target with recruitment strategies.

Table 22: Comparison of Means: Motivation Scales and Methodology (n=271)

	Quantitative		Qualitative		
Motivation Scales	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**	**T-Test and probability**
Intrinsic Value	4.76	(0.8)	4.83	(0.6)	t=0.71, ns
Self Regulation	4.28	(0.8)	4.20	(0.8)	t=0.80, ns
Cognitive Strategy Use	4.53	(0.6)	4.46	(0.7)	t=0.84, ns

There was no significant difference in the motivational scales for the two groups (see Table 22). Whether completing a qualitative or quantitative based research project, respondents were motivated to complete the project. Both groups had slightly higher intrinsic motivation. Did their research environment have a part to play in this?

Table 23: Comparison of Means: Research Environment Scales and Methodology (n=271)

Research Environment Scales	Quantitative		Qualitative		
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**	**T-Test and probability**
Learning Community	4.05	(0.8)	3.80	(0.7)	t=2.33, p=0.021
Research Support	4.35	(0.6)	4.23	(0.7)	t=1.30, ns

There was a difference in the two research environment scales as shown in Table 23, demonstrating that students using quantitative methods are more likely to be positive about the learning community and research environment in which they conducted their projects. In particular there was a significant difference in the level of response to the Learning Community scale. Predominantly those students completing quantitative-based studies had a greater connection with the learning community.

Identifying as being part of a group may play a part in this, given that students using quantitative methods are more likely to be based in the laboratory and for their research to involve a group of researchers (44%). For the students involved in qualitative-based research only (23%) of the cohort identified as being involved in a research group for their research.

Table 24: Comparison of Means: Research Self Efficacy Scales and Methodology (n=271)

Research Self Efficacy Scales	Quantitative		Qualitative		
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**	**T-Test and probability**
Conceptualisation	4.44	(0.8)	4.21	(0.7)	t=2.18, p=0.030
Early Tasks	4.45	(0.8)	4.17	(0.8)	t=2.66, p=0.008
Implementation	4.37	(0.8)	4.03	(0.8)	t=3.07, p=0.002
Presenting the Results	4.41	(0.9)	4.02	(0.8)	t=3.42, p=0.001

The means of the two methods groups were compared across the four research self-efficacy scales as shown in Table 24. There were significant differences between the means for respondents carrying out quantitative and qualitative based projects, particularly for the later phases of the research project. This confirms that those students using quantitative-based methods were more confident than those respondents carrying out qualitative-based methods.

The characteristics of respondents utilising two different types of methodology were investigated in this section. The data shows that the personal characteristics of the groups did not differ very much and that their programs varied only in terms of the frequency of contact with their supervisor and the involvement with a group in carrying out the research. This may have impacted on the connection with the learning community, which was lower for students involved in qualitative research methods. Of the respondents carrying out qualitative and quantitative-based research projects, there were no significant differences in the motivation of these students. However, the data show that respondents who carried out quantitative-based projects were more likely to have confidence in carrying out the research tasks in comparison to those respondents with qualitative-based projects. Was the laboratory-based community a factor in the higher confidence in carrying out research tasks, given that there is a research group to support these students? This is explored in the next section.

6.10.2 Comparison using laboratory-based research projects

There are strong indications in the literature that laboratory-based researchers are more likely to complete their doctoral thesis in a timely manner (Sinclair, 2005; Bowen & Rudenstein; Seagram et al, 1998; Wright & Cochrane, 2000) and to be supported (Deem & Brehony, 2000). These data are also supported by the research undertaken across a range of disciplines at the University of Adelaide where a laboratory-based undergraduate degree was a significant factor in choosing to continue on to Research Higher Degrees (Mullins, 2006; 2004).

The number of respondents enrolled in laboratory-based programs was 77 (26%), with 52 (66%) being male, much higher than the overall percentage of males (49%). Those programs classified for this study as being laboratory-based included: science; chemical engineering; and the double degree incorporating science and teaching. The data were cross checked to ensure that the degrees identified were in fact laboratory-based using the information given by respondents in the questionnaire about their need to access a laboratory for their research. For the identified laboratory-based programs 86% required a laboratory for their research, and for the non laboratory-based programs only 14% required a laboratory.

Table 25: Comparison of Means: Intention Scale and Laboratory-Based Programs (n=294)

Intention Scale	**Laboratory**		**Non Laboratory**		
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**	**T-Test and probability**
Intention to continue to RHD	1.82	(0.8)	1.52	(0.5)	t=3.22, p=0.001

Respondents enrolled in laboratory-based degrees were more likely to have an intention to continue on to research postgraduate degrees (23%) as opposed to those enrolled in non laboratory-based degrees (10%). As shown in Table 25 there was a significant difference between the two groups in terms of intention to continue, meaning that generally speaking those in laboratory-based programs were more likely to intend to continue with their research. This confirms findings by Mullins (2006; 2004).

Students in laboratory-based programs were more motivated than their counterparts as shown in Table 26, both intrinsically (4.97) and through their cognitive strategy use (4.68). There was no significant difference, however, for the self regulation scale.

Table 26: Comparison of Means: Motivation Scales and Laboratory-Based Programs (n=287)

Motivation Scales	Laboratory		Non Laboratory		
	Mean	Standard Deviation	Mean	Standard Deviation	T-Test and probability
Intrinsic Value	4.97	(0.8)	4.77	(0.7)	t=2.17, p=0.031
Self Regulation	4.42	(0.7)	4.24	(0.8)	t=1.74, p=0.084
Cognitive Strategy Use	4.68	(0.6)	4.50	(0.6)	t=2.20, p=0.029

There is much anecdotal evidence to suggest that those students working in a laboratory-based situation are more confident with research tasks, owing to the strong support they receive from research groups within the laboratory and the one-to-one training they receive from supervisors, as opposed to generic research training courses. So, were the respondents in laboratory-based programs in this study more confident in carrying out research tasks?

Table 27: Comparison of Means: Research Self Efficacy Scales and Laboratory-based Programs (n=280)

Research Self-Efficacy Scales	Laboratory		Non Laboratory		
	Mean	Standard Deviation	Mean	Standard Deviation	T-Test and probability
Conceptualisation	4.72	(0.5)	4.24	(0.8)	t=5.05, p=0.000
Early Tasks	4.76	(0.6)	4.18	(0.8)	t=5.76, p=0.000
Implementation	4.69	(0.6)	4.06	(0.9)	t=6.07, p=0.000
Presenting the Results	4.75	(0.6)	4.06	(0.9)	t=6.53, p=0.000

The means of the two different groups were compared across the four self-efficacy scales as shown in Table 27. There was a significant difference between the means for laboratory-based and non laboratory-based programs for all research self efficacy scales. This confirms that those students from laboratory-based programs were more confident in carrying out research tasks than their non-laboratory counterparts. Did their research environment have a part to play in this?

There was a significant difference in the two research environment scales as shown in Table 28, demonstrating that students in laboratory-based degrees are more positive about the learning community and research environment in which they conduct their projects.

Table 28: Comparison of Means: Research Environment Scales and Laboratory-based Programs (n=287)

Research Environment Scales	Laboratory		Non Laboratory		
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**	**T-Test and probability**
Learning Community	4.35	(0.7)	3.77	(0.8)	t=5.74, p=0.000
Research Support	4.63	(0.7)	4.20	(0.7)	t=4.92, p=0.000

Identifying as being part of a group may be a part in this, given that students in laboratory-based programs were more likely to identify that their research involved a group (62%). Of the students in the non laboratory-based programs, only 24% of the cohort identified as being involved in a group for their research.

In terms of the learning community, supervision plays an important role. In this analysis frequency of contact with supervisor was re-coded into two categories to allow comparison using cross tabulation. The two categories formed were High (daily, weekly or fortnightly meetings) and Low (monthly or less than monthly). As shown in Table 29, those students in laboratory-based programs were more likely to have a higher level of contact with their supervisor (80%). There was a significant difference between the laboratory and non laboratory programs in terms of Frequency of Contact as indicated by the Chi-Square Test value which was 40.887 (df=1, p=0.000).

Table 29: CrossTab Contact with Supervisor and Laboratory-based Programs (n=284)

Contact with Supervisor	Laboratory	% within Laboratory	Non Laboratory	% within Non Laboratory
High	61	80%	76	37%
Low	15	20%	132	63%
Total	***76***	***100%***	***208***	***100%***

Students in laboratory-based programs also viewed their supervisor as having more expertise than those in non laboratory-based programs, with 90% indicating that their supervisor had 'a lot' of expertise as shown in Table 30. There was a significant difference between the laboratory and non laboratory programs in terms of Supervisor Expertise as indicated by the Pearson Chi-Square value which was 26.688 (df=2, p=0.000).

Table 30: CrossTab Supervisor Expertise and Laboratory-based Programs (n=284)

Supervisor Expertise	Laboratory	% within Laboratory	Non Laboratory	% within Non Laboratory
A lot	68	90%	118	56%
Some	3	4%	48	23%
None	5	6%	42	20%
Total	***76***	***100%***	***208***	***100%***

In summary, the data show that those involved in a laboratory-based program were more likely to have the intention to continue with their research through research higher degrees. They were more intrinsically motivated, and had more contact with their supervisor who they predominantly viewed as having a lot of expertise in their area of study. They viewed their research environment more positively than those who were not enrolled in laboratory-based degrees and were more confident in carrying out research tasks.

6.10.3 Comparison using type of Honours program

Another way to explore the data is by looking at the type of fourth-year program. As shown earlier, fourth-year research projects under investigation in this study can be divided into two different types. The first are the End-on programs which describe an Honours year which follows the successful completion of an undergraduate degree. This type of program includes 18% of the respondents in the study. The second are research-based programs embedded into the fourth year of an undergraduate degree. These make up by far the largest group, namely the remaining 82% of respondents. In analysing the data for this large group of Embedded programs there were some significant differences in the means of some of the key variables.

In terms of research self efficacy it was found that the Education students had significantly different means for all four scales: Conceptualisation; Early Tasks; Implementation; and Presenting Results (see Table 31). These data had been collected at a different time to the rest of the data, due to the difficulty in accessing the cohort at the end of their Teacher Research Project when they were on their teaching internship off-campus. The data were collected in the middle of their project, rather at the end. Therefore owing to the significant difference in the results and data collection it was decided to keep the education data in a separate category to the Embedded fourth-year programs and End-on Honours programs when these comparisons were being made.

Table 31: Mean and standard deviation of Research Self Efficacy Scales of data in Education and Embedded Programs

Research Self-Efficacy Scales	**Education**		**Embedded program (excluding Education)**		
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**	**T-Test and probability**
Conceptualisation	4.58	(0.7)	4.16	(0.8)	t=4.08, p=0.000
Early Tasks	4.54	(0.7)	4.09	(0.8)	t=4.13, p=0.000
Implementation	4.42	(0.8)	3.98	(0.8)	t=3.79, p=0.000
Presenting the Results	4.45	(0.8)	3.98	(0.8)	t=3.96, p=0.000

The data were divided into the three types of fourth-year programs undertaken by respondents. Table 32 shows the distribution of respondents across three categories: fourth-year Embedded program, excluding Education (25%); End-on Honours year (18%); and fourth-year Education students (57%).

Table 32: Frequency of Responses to Type of Honours (n=295)

Type of Honours	Frequency	Percent	Disciplines
End-on Honours Year(End-on)	54	18	Arts Design & Communication Science
Four-Year Embedded Program	76	25	Engineering Construction Management Speech Pathology
Teacher Research Project	165	57	Teaching Teaching/ PDHPE Teaching/ Music Teaching/ Design & Tech Teaching/ Fine Arts Teaching/ Science Teaching/ Arts Teaching/ Early Childhood Education

For students who were enrolled in an End-on Honours program, the most common reason for choosing Honours was to continue on to postgraduate research studies (38%) or because they were invited to continue to Honours by an academic member of staff (23%). For those respondents in both types of four-year Embedded programs, the fourth year of their degree was compulsory.

The intention of respondents in each type of program to continue on to postgraduate research studies in shown in Table 33. The group with the highest intention is the students completing an End-on program (41%). This group also has a high percentage of students who are uncertain as to whether they will continue or not (46%). All of the Embedded fourth-year programs have a high percentage of students who do not intend to continue on to postgraduate research, with Education in particular having a higher proportion of students who have no such intention. End-on students who were not committed could leave with a ‘pass’ degree, while for Education and Engineering, for example, students were required to complete the project to receive their award. There was a significant difference between the types of Honours programs in terms of their Intention to undertake RHD, as indicated by the Pearson Chi-Square value which was 62.376 (df=4, p=0.000).

Table 33: CrossTab Intention to undertake RHD and Type of Fourth Year

	Yes	%	Uncertain	%	No	%	Total
End On	22	41%	25	46%	7	13%	54
Embedded	9	12%	22	29%	45	59%	76
Education	9	5%	48	29%	107	66%	164
	40	14%	95	32%	159	54%	294

Overall there are sufficient differences in data presented to justify a further exploration of the data in terms of the type of Honours program being undertaken. The next three chapters will explore the three types of programs: End-on Honours, Embedded Honours and the practice-based research project.

6.11 Summary

This chapter presented results arising from the second phase of data collection, the student questionnaire, which was distributed to fourth-year students involved in a range of undergraduate research programs. Generally, respondents were confident about their fourth-year research experience and were determined to see the project through. They were also confident about research tasks, particularly at the conceptual and early stages of the research journey. Students participating in the study were positive about the research support given by the university such as access to facilities, however, demonstrated an overall ambivalence towards support given by the learning community.

Of the respondents who provided a research journey plot, the majority finished with a positive disposition towards research. The journeys of respondents from different disciplines varied in duration and also in the level of complexity of the journey. Respondents labeled the events on their journey which were categorised into task-related events and personal events. Apart from the obvious euphoria of Completion, the Research Question was the event with the strongest positive intensity for students overall. On the other hand, the events with the strongest negative intensity experienced by students overall were the Research Proposal and Ethics. In terms of the more personal events identified along the journey, access to support for their research had the most positive experience impact on the journey for students. On the whole students felt that they did not meet the expectations for the research journey, and this was the lowest overall result for respondents.

The development of a measure of research preparedness was undertaken drawing together different aspects of the student experience of research. The scales were grouped into four areas: Research Self Efficacy (Conceptual, Early Tasks, Implementation, Presenting Results); Motivation (Intrinsic Motivation, Self Regulation, Cognitive Strategy Use); Research Environment (Resource Support, Learning Community) and a new scale called Research Orientation (Intention to Continue, Relationship with Academic Staff, Positive Start to Research Journey). The items contributing to Research Preparedness were computed to represent the measure as a weighted total score. As a whole, student responses generally perceived high research preparedness. Gender made a significant difference to a student's preparedness for research, with male students more likely to show evidence of research preparedness than their female counterparts

The data were investigated in three different ways in this chapter. Firstly, the data were explored in terms of the type of methodologies utilised by respondents in their research project. The two main groups were respondents who used either quantitative or qualitative methods in their research. The two groups of respondents who identified either qualitative or quantitative methods shared similar characteristics. They were predominantly young, full-time students who supported themselves through part-time work and government subsidies. Students who completed quantitative studies, however, were more likely to be a part of a research group and to meet with their supervisor more frequently and they also showed a higher level of attachment to the learning community. They were also more confident about the research tasks required for the project.

The second way in which data were explored was by investigating laboratory-based and non-laboratory based programs. Respondents from laboratory-based programs were found to be more likely to intend to continue to postgraduate study. They were more confident about all stages of the research project than their non-laboratory counterparts and more positive about the research support given by the university. They were more intrinsically motivated and had more contact with their supervisor who they predominantly viewed as having a lot of expertise in their area of study. They viewed the learning community more positively than the other groups.

Finally, the data were explored in terms of the type of fourth-year program. The End-on group was relatively small compared with the group in the Embedded programs. Overall, by far the largest group of respondents from Embedded programs was that from the Faculty of Education, occasioned by the relative size of the cohort within the university, and the fact that the fourth-year research project was compulsory for all students. This caused some difficulties in the presentation of data, due to the size of the cohort and the time of data collection which was earlier than other programs. The data are of specific interest, particularly owing to the paucity of literature on pre-service teacher research, and its contribution to the field of knowledge in education. Consequently they were separated from the other Embedded Honours students giving three groups: End-on, Embedded other than Education and Education. The next three chapters return to the nature of the student experience according to the type of fourth-year program students have undertaken.

7 END-ON HONOURS PROGRAMS

7.1 Introduction

The previous chapter overviewed the student questionnaire data and provided a rationale for the presentation of the next three chapters. This chapter draws on the responses from students completing their research project in End-on Honours programs. These programs are offered as an add-on year after completing a Bachelor degree, and require students to attain a high level of academic achievement throughout their three-year Bachelor degree. Students choose to stay at university to complete the one-year Honours and enrol in the program through the national University Admissions Centre (UAC).

End-on Honours programs are predominantly viewed as research preparation for higher research degrees. The one-year Honours is widely used as selection for and a predictor of success in doctoral research study. Graduating with First Class Honours is still the 'gold standard' in identifying outstanding candidates for continuing on to doctoral research scholarships (Kiley et al, 2009). Indeed it is one of the requirements necessary for gaining an Australian Postgraduate scholarship despite feelings from some academic staff that a Second Class Division I Honours would still lead to successful completion of a PhD (see Chapter Four). Nevertheless it is difficult to find evidence to support the premise that completing a successful Honours year will lead to a higher quality doctorate (Shaw & Holbrook, 2006). Even quality assurance processes such as the *Course Experience Questionnaire* and *Postgraduate Research Experience Questionnaire* do not track data for Honours students and, as such, their experience remains largely invisible.

End-on Honours programs fall in the nexus between teaching and research. Although essentially an undergraduate program, particularly in an administrative sense, the student experience is very similar to that of research higher degree students. Owing to the nature of the one-year research project there is greater focus on one-to-one instruction with a supervisor. If there is coursework, it is designed to support the development of specific research skills or higher level thinking in a disciplinary context. As Lovitts (2001) found in her US study of doctoral attrition, the transition from 'consumer of knowledge' to 'producer of knowledge' is hard for many students. In the US system, this transition occurs during the five-year doctorate but in Australia the transition is arguably the Honours year, which allows successful students to fast-track to the doctorate. It is imperative to understand what makes the Honours experience successful, with students ready to engage in further research. The discussion gains momentum as the recent national enquiry into higher education suggests an increase in the numbers of postgraduate students and the need for career academics in Australia before 2020 (Bradley et al, 2008).

The choice of Honours topic is often instrumental in the development of areas of specialisation for a student, which they may then pursue for the rest of their academic or professional career (Becher, 2002). In line with these findings, Honours students have usually already investigated a specific topic area and have a supervisor in mind who they want to work with, particularly in the End-on programs where the thesis forms the basis of their Honours program. Research has found that student intention to continue to further research is influenced by their connection with academic staff during this research experience (Mullins, 2006; Neumann, 2003). Students are generally able to undertake one-year Honours programs outside the institution where they completed their Bachelor degree, and are often encouraged to be mobile (Kiley & Austin, 2000). The transferability of the program is therefore crucial, both within Australia and abroad. The changes to higher education globally make it difficult to situate the one-year Honours program, as it is not a program readily recognised outside Australia (Kiley et al, 2009). By elucidating the experience of students involved in End-on Honours programs, particularly compared to fourth-year students in other Honours programs, the value of the one-year research program will be more apparent.

The findings from the student questionnaire are reported in this chapter in relation to the End-on Honours students. Apart from a general overview of the participants from the End-on Honours programs, there will also be an emphasis on how motivated and confident the students were about doing research and what their research environment was like. In particular their research experience will be explored in terms of the milestones they self-identified along their journey, and what they perceived as the highs and lows. The intention to undertake higher degree research studies will be explored, and whether students felt they were ready to undertake further research. The following two chapters will then report in a similar manner on the findings from the Embedded Honours program data and the Teacher Research Project data.

7.2 Demographic information

The 54 respondents represented 48% of the students enrolled in the End-on Honours programs at this site. The respondents were predominantly from Science programs (74%), with the remainder from Arts-based disciplines (26%). There was an equal representation of males and females in the cohort, with the majority (85%) aged between 21 and 24 years.

The questionnaires were distributed to Honours students at the end of their second semester of study. When possible, questionnaires were distributed after the final seminar, where students presented their thesis to interested peers and academic staff in their School. Students had predominantly finished their theses at this stage of the year, and so were able to reflect on their experience. For those programs where there was no final seminar, it was difficult to collect data for the study, as discussed in Chapter Three. For this reason there may be an imbalance in the analyses towards those Honours students who had a final seminar as a component of their program. In this sample, the only responses which were not disseminated at a final seminar were those from the Bachelor of Arts (Honours) program, however, they comprised only 10% of respondents in this data set.

The survey was completed on a voluntary basis, and no names were collected ensuring that the responses were anonymous. The researcher attended one of the smaller seminars in the Physics department by invitation from the Coordinator. It was clarified that involvement in the study was entirely voluntary and that completion of the questionnaire was not a part of the seminar process. There were four Honours students who presented their work and were then invited to participate in the study. Those electing to participate (three students) provided their data at the completion of the presentations.

The primary intent was to collect data that captured all stages of the research process, and to obtain a perspective on the positive or negative orientation to the different elements of the process. To achieve the latter a 'journey' plot was incorporated as the final section of the questionnaire. The plot was completed by 91% of the students who responded to the questionnaire, which was a high rate of participation in comparison to the other cohorts in four-year Embedded programs.

The questionnaire asked for demographic information about the respondent, information about the structure of their program and details about the research project (See Chapter Three). It contained items grouped in the areas: research efficacy, research environment, learning motivation and research orientation. The learning motivation, research self efficacy and research environment areas were developed from existing scales and the literature on undergraduate research student experience.

As discussed previously, all three scales have a series of statements where the respondent was asked to indicate on a six-point Likert scale the extent of their agreement with the statement, from Strongly Disagree (1) to Strongly Agree (6). A score of 3.5 on such a scale indicated neither agreement nor disagreement.

7.3 Were the students motivated?

Access to students completing Honours programs provided a valuable opportunity to explore how students reacted to the demands made of them to become independent professional learners in a research and training context. But how motivated were they?

Three areas of motivation were explored – Intrinsic Value, Self-regulation and Cognitive Strategy Use. The scale descriptors and characteristics are shown in Table 34.

Table 34: Learning Motivation scale characteristics by Degree (n =54)

Degree	Number of respondents	Intrinsic Value Mean (SD)	Self Regulation Mean (SD)	Cognitive Strategy Use Mean (SD)
Environment & Life Sciences	28	5.21 (0.7)	4.59 (0.6)	4.86 (0.6)
Communications & Design	9	5.11 (0.4)	4.27 (0.9)	4.69 (0.5)
Mathematics & Physical Sciences	6	5.63 (0.3)	5.07 (0.5)	4.96 (0.3)
Arts	6	5.46 (0.3)	4.40 (0.4)	4.88 (0.9)
Biomedical Science	5	4.95 (0.3)	4.36 (0.4)	4.65 (0.5)
Overall group	**54**	**5.24 (0.6)**	**4.55 (0.7)**	**4.82 (0.6)**

Students were motivated to complete their research project, with the means of Cognitive Strategy Use and Self Regulation falling between 'tend to agree' and 'agree', and the mean for Intrinsic Value falling between 'agree' and 'strongly agree'. The student's perceptions of their self regulation and cognitive strategy use were positive, suggesting that at this late stage in the course they were, as a group, determined to see it through and they felt they could meet the intellectual challenges. Students also at the end of their project perceived that their intrinsic motivation to complete a fourth-year research project was strong, indicating a continued internal determination to complete the project. There were no significant differences between degrees for any of the learning motivation scales.

7.4 Were the students confident?

Four areas measuring student confidence in carrying out research tasks at different stages of the research process were explored: Conceptualisation; Early Tasks; Implementation; and Presenting the Results. The means for all four scales fall between 'tend to agree' and 'agree', indicating a tendency to be confident about the research tasks they carried out in their projects as shown in Table 35.

Table 35: *Research Self Efficacy* scale characteristics (n = 54)

Degree	Number of respondents	Conceptual Mean (SD)	Early Tasks Mean (SD)	Implement Mean (SD)	Presenting the Results Mean (SD)
Environment & Life Sciences	28	4.80 (0.5)	4.92 (0.5)	4.74 (0.5)	4.88 (0.4)
Communications & Design	9	4.56 (0.5)	4.64 (0.4)	4.64 (0.4)	4.51 (0.5)
Mathematics & Physical Sciences	6	4.47 (0.5)	4.6 (0.8)	4.73 (0.6)	4.73 (0.7)
Arts	6	4.73 (0.9)	4.80 (0.8)	4.83 (0.8)	4.63 (0.9)
Biomedical Science	5	4.60 (0.6)	4.48 (0.5)	4.32 (0.6)	4.56 (0.6)
Overall group	**54**	**4.70 (0.6)**	**4.79 (0.6)**	**4.70 (0.6)**	**4.74 (0.5)**

Most respondents in this data set indicated they felt more confident with conceptual tasks such as brainstorming ideas for the literature and early tasks such as generating researchable questions. Students tended to feel just as confident with tasks such as choosing the appropriate data analysis techniques and presenting results such as interpreting and understanding statistical printouts. There were no significant differences between degrees for any of the Research Self Efficacy scales. The respondents were, on the whole, confident with all research tasks undertaken in their research project. This confidence in completing research tasks may also positively influence their intention to continue, which was found to be stronger than for respondents from other types of fourth-year program as discussed later in the chapter.

7.5 Did the Research Environment support students?

Students felt positive about their motivation to complete the project and tended to perceive they were confident in the tasks required. However, were they ready for the essentially independent research experience of setting up their own project and did they feel well-supported? Two scales were developed to investigate – the research support scale and the learning community scale.

On average the respondents agreed with statements forming the Learning Community Scale as shown in Table 36. Respondents agreed with items in the Research Environment scale, with means falling between 'tend to agree' and 'agree'. They felt attached to the faculty or university community, and felt positively about accessing the academics in the School to share ideas and to discuss problems they might be experiencing with their research. There were no significant differences between degrees for either of the research environment scales.

Table 36: *Research Environment* scale characteristics (n = 54)

Degree	Number of respondents	Learning Community Mean (SD)	Research Support Mean (SD)
Environment & Life Sciences	28	4.54 (0.7)	4.68 (0.6)
Communications & Design	9	4.24 (0.6)	4.27 (0.4)
Mathematics & Physical Sciences	6	4.81 (0.5)	4.90 (0.5)
Arts	6	4.25 (0.9)	4.97 (0.5)
Biomedical Science	5	4.03 (0.7)	4.68 (0.7)
Overall group	**54**	**4.44 (0.7)**	**4.67 (0.6)**

Respondents were also positive towards the statements forming the Research Support Scale. They felt that they had a positive research environment, in terms of access to resources, services and networks on campus. Indeed, on the whole, the End-on Honours students who completed the questionnaire indicated that they felt that they had access to 'a lot' of the facilities required for their research (63%). Clearly overall, this group of students felt well-supported by the university to complete their research project.

7.5.1 The relationship between research confidence and access to facilities

Access to facilities provided by the university was important to the level of confidence students had about completing research tasks. Although it was not significant in the early conceptualisation of the project, the provision of facilities for research became more important to student's perception of confidence in research tasks as they progressed through the study. As demonstrated in Table 37, the correlation between research self efficacy and facilities provided was most significant with the Presenting Results phase of the project (r=0.35).

Table 37: Significant correlation with *Provision of Facilities* and *Research Environment (n=54)*

RSE Scales	Facilities provided for research
Conceptualisation	NS
Early tasks	0.28*
Implementing the research tasks	0.34*
Presenting Results	0.35**

**Correlation significant at the 0.01 level (2-tailed)
*Correlation significant at the 0.05 level (2-tailed)

This is an area Faculties could further develop by directing more of their resources to support students in the presentation of their projects and providing greater access to these facilities. It should be noted that the relationship between the facilities provided and confidence with tasks in the implementation phase was also quite strong, and that this is also an area requiring high access to facilities, particularly in the Science-based research programs where it is imperative that students have access to specific equipment in the laboratories and are part of an effective and supportive research group. An important part of an effective support structure as indicated in the doctoral education literature is supervision.

7.5.2 Supervision

Supervision was an important part of the undergraduate research student's experience, particularly in the Science fields where the predominant method of research training is one-to-one with their supervisor and through research groups (Deem & Brehony, 2000). Supervision for this cohort was mainly through an individual supervisor (70%), although a number of students did have either two (24%) or more than two supervisors (6%). Supervisors were predominantly male (72%), or the student had a combination of male and female supervisors (19%). Only 9% of respondents had a sole female supervisor.

A large proportion of students felt that they had a lot of choice in the topic they were studying (46%), and almost all felt that their supervisor had a lot of expertise (93%). Respondents indicated that they had daily (17%) or weekly (56%) contact with their supervisor, signifying a high level of contact. Some respondents met less frequently on a fortnightly basis (22%) with few, in comparison to other fourth-year programs, meeting monthly (5%). A high proportion of respondents in the Honours program indicated that their research involved a group (67%), and had a high level of contact with their profession or with the industry-related to their discipline (70%). These data supported the findings from the Learning Community Scale, showing that as a group these students were well supported by their supervisors, research groups and members of their industry or profession.

Another significant relationship was that between Intrinsic Motivation and the Frequency of Meeting with their Supervisor, indicating that the more internally-motivated these students were, the more often they would meet with their supervisor (see Table 38). Intrinsic Motivation also had a significant correlation with both Research Environment scales, indicating that the more intrinsically motivated they were, the more likely they were to seek support within their learning community and utilise the resources available to them.

Table 38: Significant correlation with *Intrinsic Motivation scale* and *Research Environment scales (n=54)*

Item/Scales	Intrinsic Motivation Scale
Frequency of Meeting Supervisor	0.31*
Learning Community Scale	0.46**
Research Support Scale	0.44**

**Correlation significant at the 0.01 level (2-tailed)
*Correlation significant at the 0.05 level (2-tailed)

7.5.3 Relationship between choosing to study Honours & Intention to Continue with Postgraduate Studies

For this group of students who had chosen to enrol in an Honours program after completing their undergraduate degree, it was important to investigate the reasons that they chose to do Honours. The respondents were given a list of reasons for doing Honours to select from (see Table 39), and could select more than one reason if it applied.

Table 39: Factors for Choosing Honours (n=54) in order of frequency

Factor for Choosing Hons	Frequency	Percent within category
Continue to postgraduate	28	52%
Academic staff member invitation	20	37%
Not ready to leave	16	30%
Other students	15	28%
School/Faculty invitation	11	20%
Other	10	18%
Family and friends	5	9%
Break from study	4	7%
Total number of respondents	**54**	

The most common reason for choosing to do Honours was to continue on to postgraduate research studies. Just over half the respondents selected this reason, which was also reflected in the high scores in the Intention to Continue Scale for this group. It was clear that members of the learning community were important in persuading students to continue to Honours, with the next most common selection being that an academic member of staff had invited them to continue on to Honours or that other students or peers had influenced their decision. This is a finding supported by other studies (Mullins, 2006). Interestingly enough, almost a third indicated that were simply just not ready to leave university as yet. For the respondents who chose the ‘Other’ category most wrote that they had chosen to complete an Honours program for employment reasons such as to ‘get a better job’ and a few added that were seeking increased knowledge in their field of study. For those students who were not ready to leave, an invitation from the Faculty to let them know they were eligible for the Honours program may have persuaded them to continue on with their studies, as indicated by a strong correlation at the 0.01 level (p=0.37).

The results presented above were also supported by correlations of reasons for choosing Honours with the intention to continue on to a postgraduate research degree. Three of the reasons had a significant relationship, as shown in Table 40. Students who chose to continue on to Honours because they had been invited by a member of their Faculty or wanted to continue to a postgraduate research degree, also had an intention to continue on to research higher degrees. This reinforced findings about recruitment from the Academic Coordinator Interviews, presented in Chapter Four, which found that students were encouraged to continue on to higher research degrees when identified as a good research student and encouraged by a member of staff. The positive correlation with ‘break from study’ indicated that those students who had a break in their study before enrolling in their Honours year were more likely to intend to continue on to postgraduate research, perhaps completing Honours as the entry requirement for a research higher degree.

Table 40: Significant correlation with *Intention scale* and *Reasons for choosing Honours (n=54)*

Item	Intention Scale
Continue to postgraduate studies	0.54**
School/Faculty invitation	0.28*
Break from study	0.32*

**Correlation significant at the 0.01 level (2-tailed)
*Correlation significant at the 0.05 level (2-tailed)

Of the 54 students surveyed, a small number (13%) reported that they did not anticipate that they would go on to postgraduate research. A sizable proportion (41%) indicated that they did intend to continue. A further 46% reported they were unsure. For this quite large group of students a positive experience in their Honours or encouragement from a member of staff might 'tip the balance' in favour of some of them eventually proceeding to undertake postgraduate research. There were no significant differences between Science and Arts students on their intention to continue on to further research study (see Table 41).

Honours students involved in research groups in this cohort were more likely to intend to continue on to research higher degrees as indicated by the correlation with intention to continue to research higher degrees and research involving a group (p=0.29). However, there was a significant difference within the End-on Honours disciplines in this study, with Science students more likely than Arts students to be a part of a research group (Table 41). Research suggests that there are disciplinary differences in doctoral study for those students from Science-based disciplines. For example, in Australia Science-based candidates are more likely to complete their doctoral research programs in a timely manner (Sinclair, 2005). There are also studies which suggest a similar phenomenon overseas (Wright & Cochrane, 2000; Seagram et al, 1998; Bowen & Rudenstein, 1992). In this study involvement in a research group was an important factor in particular for students in the Science-based disciplines who intended to continue their research, and as such will be further explored.

Table 41: Comparison of Means: Research Group/Intention and End-on Program Type (n=54)

	Science		Arts		
	Mean	Standard Deviation	Mean	Standard Deviation	T-Test and probability
Research Group	1.15	(0.4)	1.80	(0.4)	t=5.61, p=0.000
Intention to Continue	2.36	(0.6)	2.07	(0.8)	t=1.42, ns

Involvement in a research group was also positively linked with students being more confident in carrying out research tasks in the later stages of the research project identified in the Research Self Efficacy Scales of Implementation of Research Tasks and Presenting Results.

Table 42: Significant correlations with *Research involves group* and *RSE/ Motivation Scales*

Scales	Research involves group
Self Regulation	0.35**
Implementation of Research Tasks	0.27*
Presenting Results	0.32*

*Correlations significant at the 0.05 level (2-tailed)

** Correlations significant at the 0.01 level (2-tailed)

Being involved in a research group also had an effect on a student's motivation, in particular Self Regulation which showed a strong correlation (see Table 42). When part of a research group, there may be more impetus on an individual to use strategies for learning so as to ensure that they are achieving to an appropriate level within their group. Given the large proportion of Science students in this cohort, and their higher propensity to be involved in research groups, it may be that the most junior members of the research team (Honours students) are being tightly managed and may have stricter deadlines to meet. This may be a factor which further emerges as research orientation of the Honours students is investigated.

7.6 Research Preparedness

It is clear from the findings for this group of students that a large number intend to continue on to further research study. Thus it was imperative to examine their preparedness for research at a higher level. The Research Preparedness Score (RPS) devised for this study comprised the motivation, research self efficacy and research environment scales already reported in this chapter. It also combined the student intention to continue on to further research studies, the type of start students had to their undergraduate research journey and the quality of relationships formed with academic staff. The reliability of the scale is reported in Chapter Six along with the analysis of the twelve factors which contribute to the score.

Table 43: ***Research Preparedness Score*** **characteristics - End-on**

Degree	**Number of respondents**	**RPS** Mean (SD)
Science	28	17.56 (1.5)
Communications & Design	9	16.31 (0.8)
Mathematics & Physical Sciences	6	18.26 (1.1)
Arts	6	17.66 (2.4)
Biomedical Science	5	16.70 (1.5)
Overall group	**54**	**17.36 (1.5)**

Students who were from End-on Honours programs boasted the highest overall RPS with a mean of 17.36 compared to respondents in the integrated Honours programs. Their RPS ranged from 14 to 21. Students with the highest RPS were from the School of Mathematics and Physical Sciences, as shown in Table 43, indicating that these students were the most prepared to continue with higher research. Students with the lowest RPS were from the Communications & Design programs. There were no significant differences between degrees in terms of the RPS.

In terms of the two main types of programs represented within this group, Science and Arts, there were no significant differences in the RPS (see Table 44). This indicates that the high RPS was due to the type of Honours program rather than the disciplinary approach. Thus the one-year research program generally could be seen as preparing respondents who completed the survey for further research.

Table 44: Comparison of Means: Research Preparedness and End-on Program Type (n=54)

	Science		Arts		
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**	**T-Test and probability**
Research Preparedness Score (RPS)	17.56	(1.4)	16.85	(1.7)	t=1.54, ns
Positive start to Journey	2.29	(0.8)	1.40	(0.6)	t=3.98, p=0.000
Quality of relationship with academic staff	4.97	(0.9)	5.60	(0.5)	t=2.60, p=0.012

On the whole, the End-on Honours students felt prepared for research and a high proportion intended to continue on to higher research degrees. However, the significant differences in their relationships with academic staff and their disposition towards the start of their research journey indicated that the experience for these groups of students was not the same (see Table 44). Science students on the whole had a more positive start to their journey; however, Arts students were more likely to have a better quality of relationship with academic staff. In the next section, the journey plot is examined in a wholistic manner to elucidate the overall experience for this group of students. Then some of the specific journey plots are examined in detail to add depth from the fourth year research student's perspective.

7.7 The Research Journey

The shapes of the plots that were recorded for this group of students were varied, indicating that they differed in their dispositions towards the research project. The types of plots show the students initial disposition towards the research project at the start, and also how they felt at the end of the project. The start and end of the plot were measured as positive, neutral or negative in nature. Table 45 shows the types of plots, in descending order of frequency.

Table 45: Types of Journey Plots (n=49)

Type of Plot	Frequency	Percent
Negative start, Positive finish	12	25
Positive start, Positive finish	11	23
Neutral start, Positive finish	10	20
Neutral start, Neutral finish	5	10
Positive start, Neutral finish	4	8
Negative start, Neutral finish	3	6
Positive start, Negative finish	2	4
Negative start, Negative finish	1	2
Neutral start, Negative finish	1	2
Total	**49**	**100**

Investigation of the types of journey plots demonstrated that there was an almost even distribution of how students started their journey, with a positive (35%), negative (33%), or a neutral (32%) disposition. Clearly most students finished the journey with a positive disposition (68%), rather than a neutral (24%) or negative (8%) one.

7.7.1 Student Experience of the Journey

By graphing the intensity of each event by the average duration of the research project on a scatterplot, a visualisation of the average journey plot for the End-on Honours students was possible.

One can expect by looking at this average plot that, for Honours students, there were many positives along their journey (see Figure 21). On average students started with a good disposition (Time 0), moved to a higher position (Time 10-

20), then to a low and high alternately (Times 30 to 70) and although there was a small dip near the end, they finished on a very high note (Time 90). The majority of time was spent in the positive region, with only a small time on average being negative and tending towards the middle of the journey.

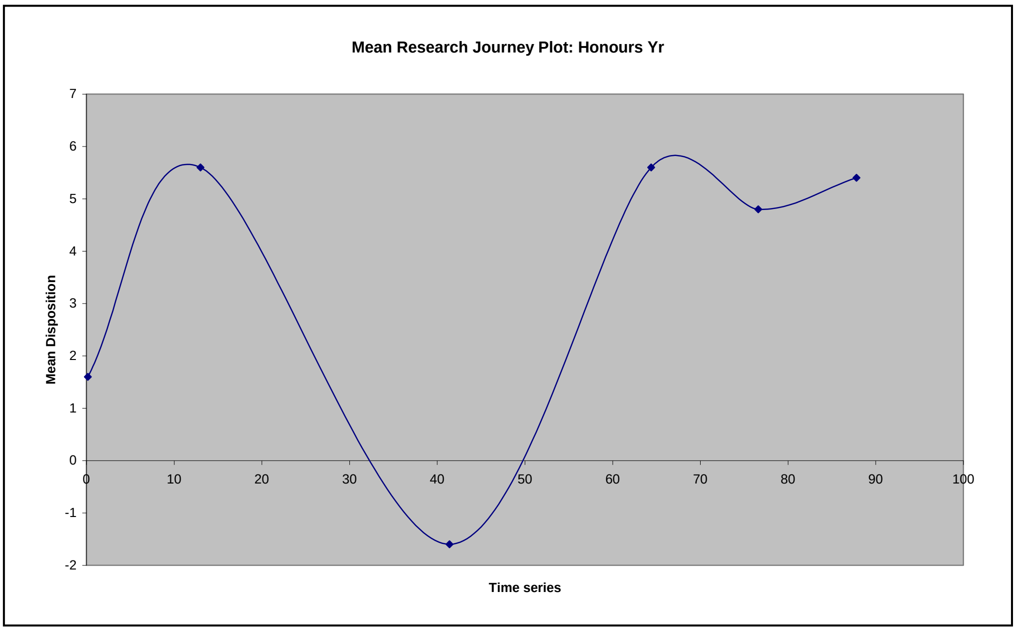

Figure 21: Average Journey Plot – End-on Honours Year

7.7.2 Complexity

A phase was recorded every time the x-axis was crossed by the self-drawn path, and this measure gave an indication of the level of complexity of each journey. For example, the average plot shown above had three phases. The range of complexity for this cohort was between 13 and 1, showing that some respondents were quite detailed in their response to this question, identifying a number of events along their journey, whereas others had identified only one event along the journey.

7.7.3 Event Intensity and Impact on the Journey

The path was unique to each respondent, as were the labels used to describe their highs and lows. These labels are referred to as Events in the student's journeys. The labelling of Events along the path was open-ended, however, during analysis they were coded to two different categories: Task Related and Personal.

Intensity gave an indication of the strength of the relationship towards the event nominated by the respondent, and was measured by position in relation to the vertical axis. Each event nominated on the journey was compared between respondents in relation to the Intensity scale.

Impact represented the amount of emphasis given to a nominated event, and was expressed in regards to the positive or negative nature of the experience. The degree of emphasis the event had on the respondent's journey emerged as a representation of the student's perception of their whole experience.

The combination of the scales of Intensity and Impact presented a powerful measure, particularly when also compared with the confidence scales of research self efficacy for the task-related events. This provided further triangulation of the data, and also added to the depth of student experience.

7.7.3.1 Task-related events

Task-related events were investigated through the level of intensity of each event (see Figure 22) and the overall impact the event had on the journey of the respondents as a group (see Figure 23). The responses to the Intensity measure ranged from -8 to 17 indicating the highs and lows for each particular task-related event. The measure of Impact gave an indication of the how the task-related event impacted on the whole journey of this group, in comparison to other events, and these responses ranged from -190 to 528.

Students who completed their End-on Honours year indicated that Coursework (+528) had the strongest positive impact on their Honours journey. This finding indicated that the coursework provided to students on the whole had a positive outcome on their journey. This was similar to the finding on the Intensity scale, where Coursework (+12) was also one of the most positive task related events, after Completion (+17). This reinforced findings in the interviews with Coordinators that the coursework provided in the End-on Honours program helped students to complete their program and to also get on top of the literature and theory in their discipline. This was further supported by the positive nature of the Literature-related tasks on both the Impact and Intensity scales.

In terms of Data Collection and Data Analysis, the results of the Journey data for Impact were also reflective of the findings in the Research Self Efficacy scales, in that students completing an End-on Honours program felt confident in carrying out research tasks, particularly in the Implementation stage of research. However, although the task of Data Analysis was positive on the Intensity scale, the finding for the impact of Data Collection on the journey was not as positive indicating that students on the whole were more equivocal about the collection of data in their research. Ethics was the lowest event identified on the Intensity Scale (-8), which indicated that students, on the whole, felt quite strong apprehension about undergoing the Ethics tasks in their research project. However, although obtaining ethics approval was a negative event overall, it had little impact on the complete journey of the group.

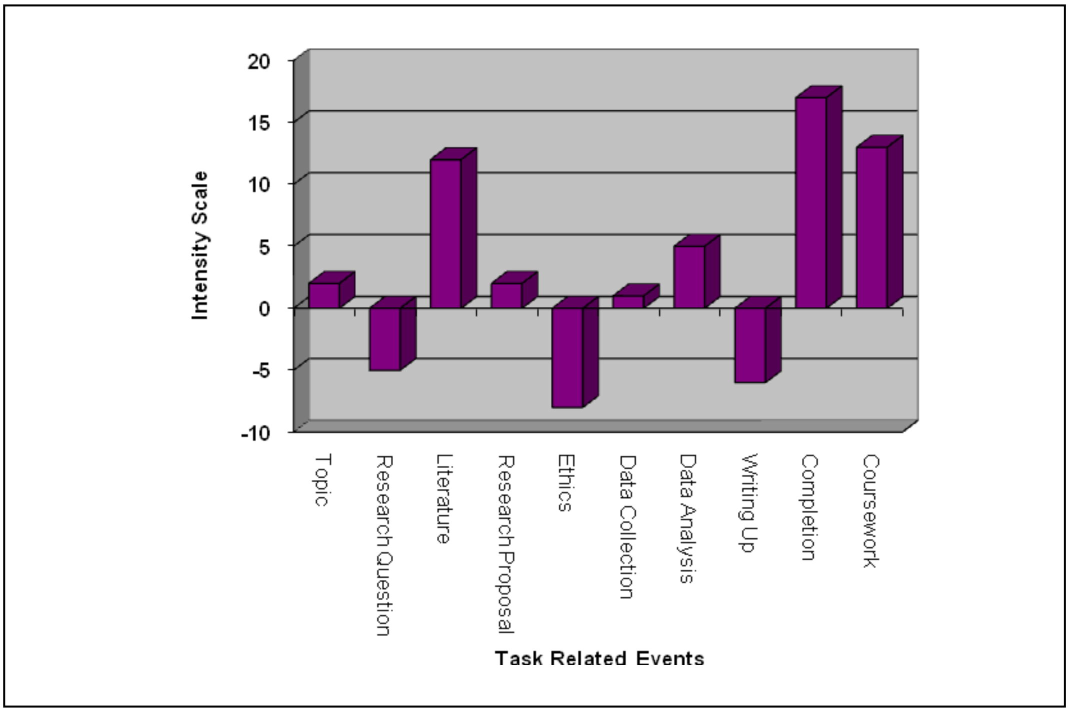

Figure 22: Intensity of Task-Related Events for End-On Honours

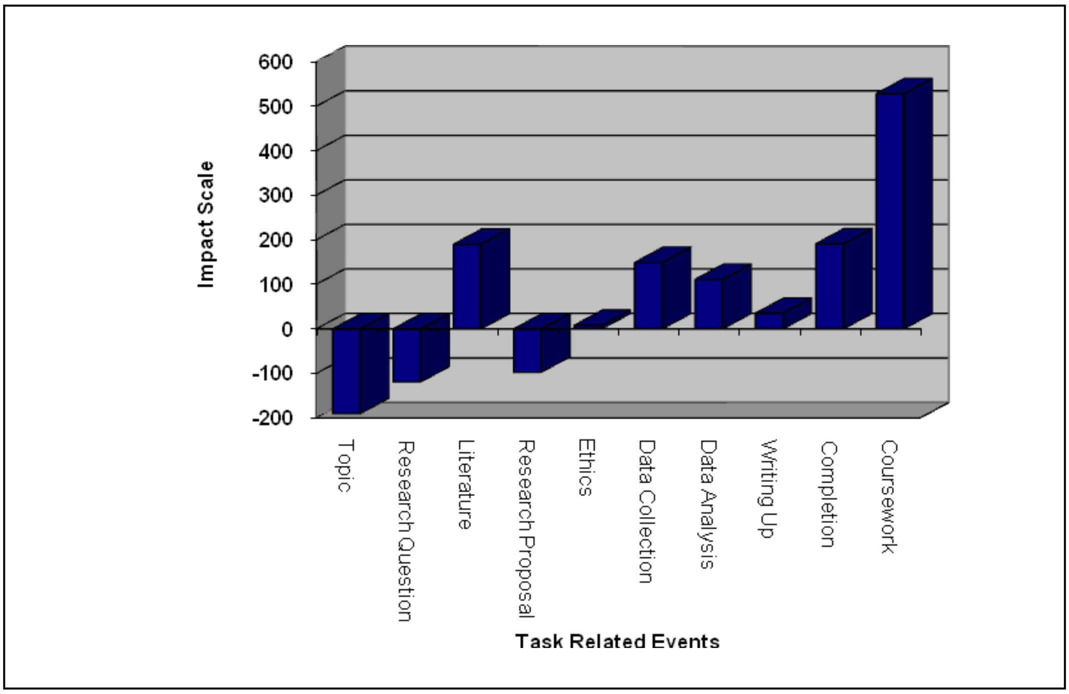

Figure 23: Impact of Task-Related Events for End-On Honours

Areas of concern identified in the Impact Journey data, which were not identified in the Research Self Efficacy scales, were those tasks in the conceptual and early stages of research, such as Research Topic, Research Question and Research Proposal which had a strong negative impact on the journeys of the End-On Honours students. Research Question was also identified as a low event on the Intensity Scale, demonstrating that this was an area of deep concern which had impacted on a number of journeys. Although the tasks of Topic and Research Proposal had a negative impact on the journeys, these tasks were not felt as intensely by the students, with the Intensity Scale for both tending to be more positive.

Writing up the project was a hurdle which many of the respondents found challenging. It had virtually a neutral result on the Impact Scale (+35) in comparison with other tasks. However, the Intensity Scale showed writing up was a problematic area causing an intense low overall. This provided greater detail in regard to the respondents' confidence in carrying out tasks in the final phase of their project. Clearly completion of the research project had a strong impact on the journeys of the students and was also an overwhelmingly positive event on the Intensity Scale. Thus the majority of respondents finished their journey with a positive outlook, as was reflected in the types of journey plots recorded earlier in the chapter.

7.7.3.2 Personal events

Personal events that were experienced by this group of students included motivation, connection with the research environment, and also the expectations and feelings expressed about their project. In terms of the Intensity scale, shown in Figure 24, respondents were on the whole intensely positive about the Learning Community (+9) and also positive about the Resource Support provided by the university. This reinforced positive findings reported from the Research Environment Scales of Research Support and Learning Community as reported earlier in this chapter. These events also had a strong positive impact on the student journeys as a whole, as demonstrated in Figure 25. Resource Support and

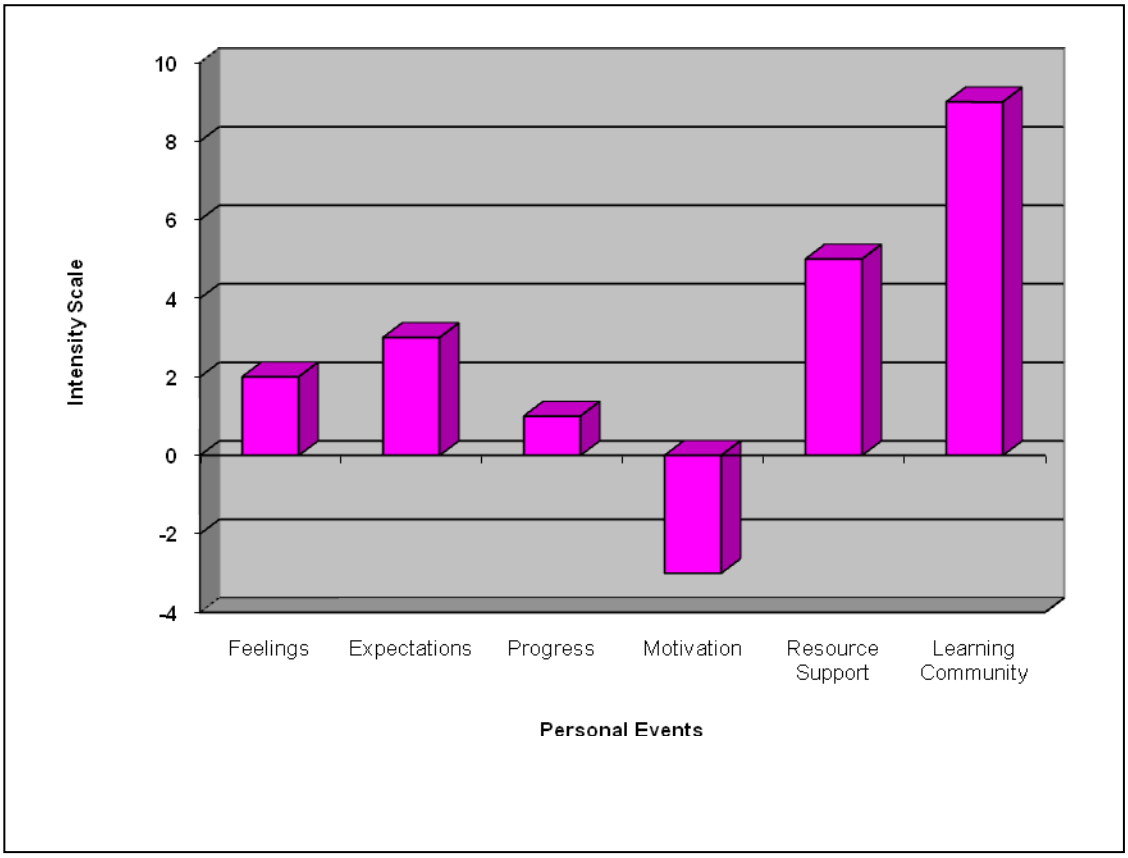

Figure 24: Intensity of Personal Events for End-On Honours

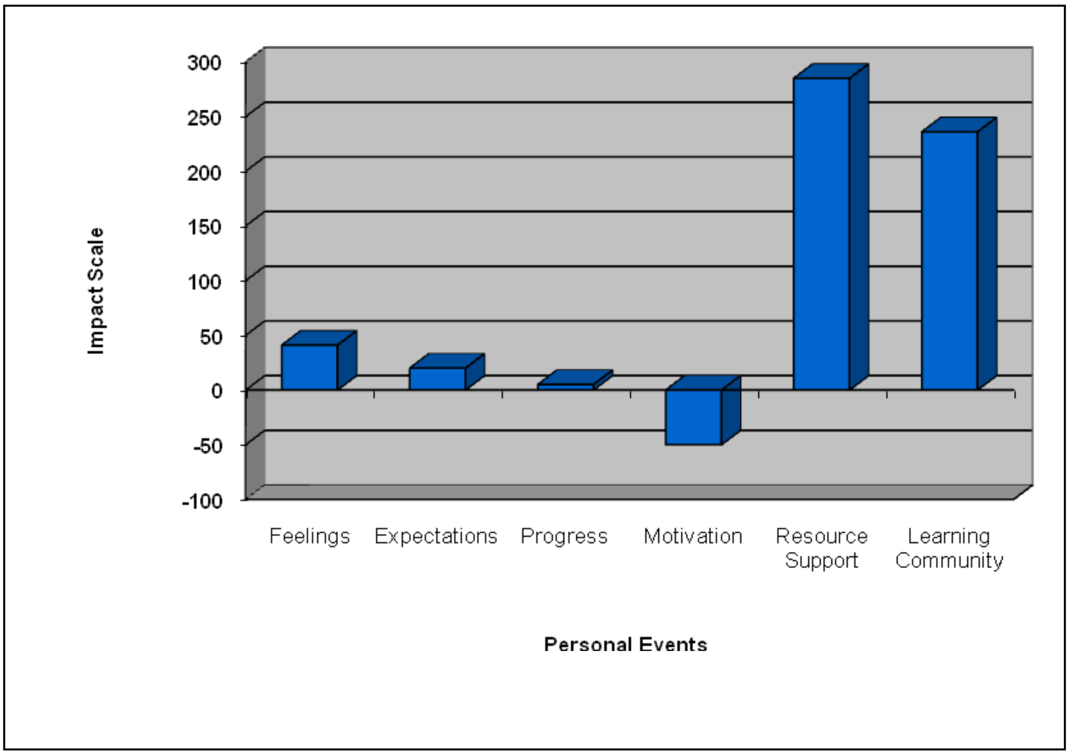

Figure 25: Impact of Personal Events for End-On Honours

Learning Community were clearly major components of the journey in terms of both the intensity of the response and the impact on the journey as a whole.

Respondents were also positive overall in their Feelings and Expectations towards research for both the Impact and Intensity measures. To a lesser extent the Progress made in their research project was also positive on the Intensity Scale, however, Progress made little impact upon the student journeys as a whole.

Motivation was the only personal event to have a small negative impact on the journey of the respondents and, in addition, respondents reflected motivation as a low on the Intensity Scale. This did not support findings from the Motivation scales reported earlier, where respondents agreed with the statements about motivation towards the project showing that they were ready for the intellectual challenges and were intrinsically motivated to complete their projects.

In order to further investigate the experience of fourth-year students completing an End-on Honours program, some of the journeys were selected to demonstrate the individual nature of the experience. The journeys selected were not just from an 'average' journey, but were also some of the more unusual journeys to illustrate the breadth of data and to further interrogate the data already reported.

7.8 Illustrative Journeys

There is a paucity of research which explores the preparedness of fourth-year students, or even attempts to compare their experiences across disciplines and programs. This section of the chapter aims to present the information gathered about a selection of individual students and present profiles based on their journeys. The respondents for each journey shown are named to add to the personal nature of the experience, however, the names are not real as the questionnaire was anonymous.

7.8.1 A typical journey - Jack

The first example of a journey discussed here typified the experience for most of the End-on Honours students, as demonstrated through the mean journey plot shown in Figure 26. Jack was an Australian male student aged between 21 and 24 years of age who both commenced and ended his journey with a positive disposition. Jack was enrolled full-time in the Mathematics Honours program straight after completing a Bachelor of Mathematics. Jack's Honours year was predominantly focused on a research thesis although it also consisted of coursework. His research involved contact with his industry or profession, although did not involve working in a research group. He had some involvement in the choice of topic. He perceived that his faculty provided a lot of facilities to enable him to carry out his research, in particular access to a computer laboratory. He met his male supervisor on a weekly basis and thought that his supervisor had a lot of expertise in his area of research.

The factors which contributed to Jack enrolling in an Honours program were a desire to continue to postgraduate research and an interest in a more complex knowledge of the area. However, he indicated on the Intention scale that he was unsure whether he would now continue on to postgraduate research studies. His research involved mathematical and algebraic methodologies and also philosophical methods. He was motivated to complete his research, as shown by positive responses to the scales of intrinsic motivation, self regulation and cognitive strategy use. His plot did not indicate any motivational events during his journey. He had a positive perception of the resource support provided by the university and had formed positive links with members of the learning community. He rated the quality of his relationships with other students and faculty members as 'helpful and supportive' and with administrative staff as 'extremely helpful and supportive'.

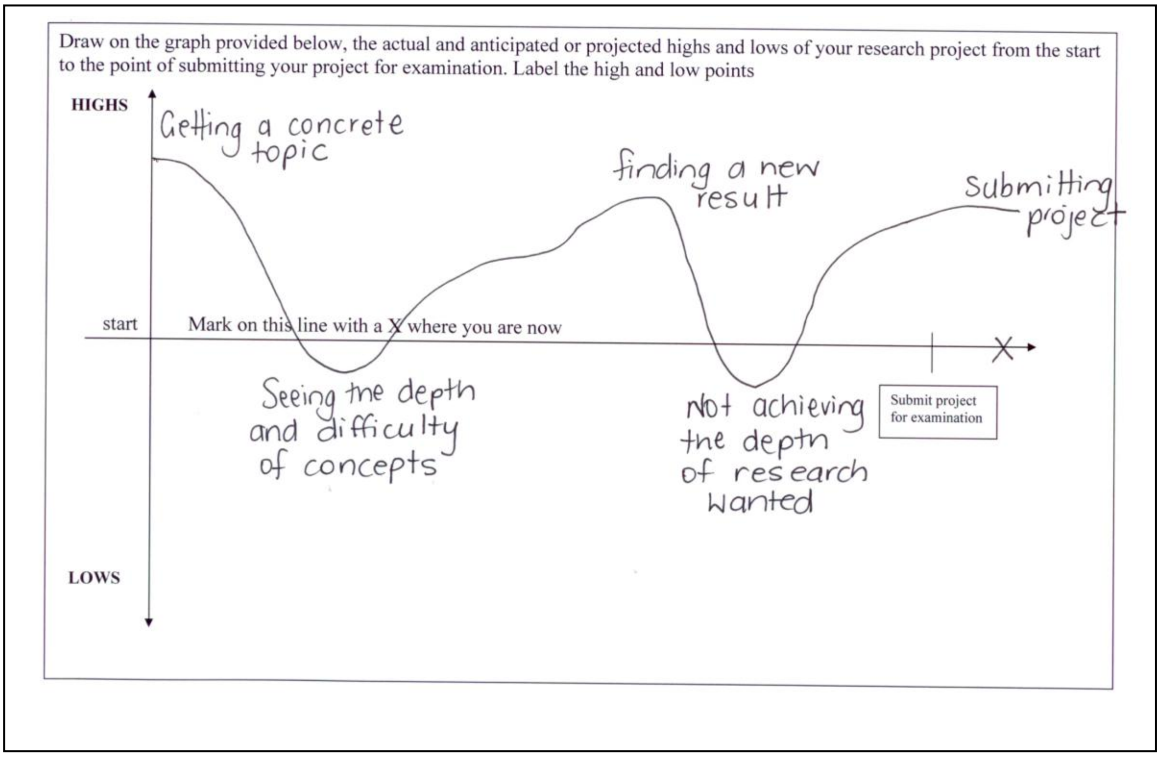

Figure 26: Journey Plot: A typical journey (Jack)

Jack's journey had an average level of complexity as shown in Figure 26. It started on a positive and ended on a positive, which was also reflective of a large number of the types of respondents' journeys as reported earlier. Jack started his journey with a concrete topic, however, his journey took a downturn when he realised the topic was more complex than he had first anticipated. His journey then took a positive turn when he found a new result, followed again by a low when he didn't achieve the depth he had wanted. His journey ended on a positive event, like so many others, when he submitted his project. It is interesting to note that Jack identified a number of positive events along the way, identifying tasks from the conceptual, implementation and presentation of results phases, showing his knowledge of the research process. His lows were related to expectations he had of himself, rather than the research tasks.

7.8.2 A complex journey - Suzy

A second respondent was a female Australian student, studying in the School of Biomedical Sciences. Suzy was completing the Honours year of a Bachelor of Biomedical Science, which was an End-on program. The Honours thesis made up 100% of her course load for the year. She believed she had no involvement in the choice of her topic, had weekly contact with her male supervisor and worked in a research group. There was no specific training program within the Honours program, with the main mode of teaching was laboratory work under the supervision of a laboratory manager. She had no interest at this point in postgraduate studies.

Suzy agreed with Learning Motivation statements about Cognitive Strategy Use (4.75) and rated Intrinsic Value (5.0) as her highest motivation indicating that she thought about her learning and was able to utilise internal strategies to motivate her learning. She tended to agree with statements about Self Regulation (4.0), indicating that she did tend to persist with work when it was hard or when it was dull and uninteresting. The overall attitude identified in her research orientation also contributed to learning motivation.

Research Environment was informed by the two scales. Suzy strongly agreed with statements from the Research Environment Scale (5.4) and she tended to disagree with statements from the Learning Community Scale (3.3), indicating, for example, that she was able to access facilities such as the library to assist her in her research but that she did not have a strong link to the university and faculty learning community. This does not make her typical of an Honours student in this data set, given that members of this group on the whole agreed with the Learning Community Scale (4.67), particularly if they had higher intrinsic motivation. Suzy indicated confidence in all four areas of Research Self Efficacy: Conceptualising (4.8); and Early Tasks (4.0); Implementation (4.2); and Presenting the Results (4.4).

Research Orientation explored research understandings and feelings towards research. The plot identifies where Suzy was in her research program and allowed us to determine areas where she was not identifying key aspects of project development. Her journey plot ended at the submission of the project, so she was able to reflect on her experience, rather than project how she might feel.

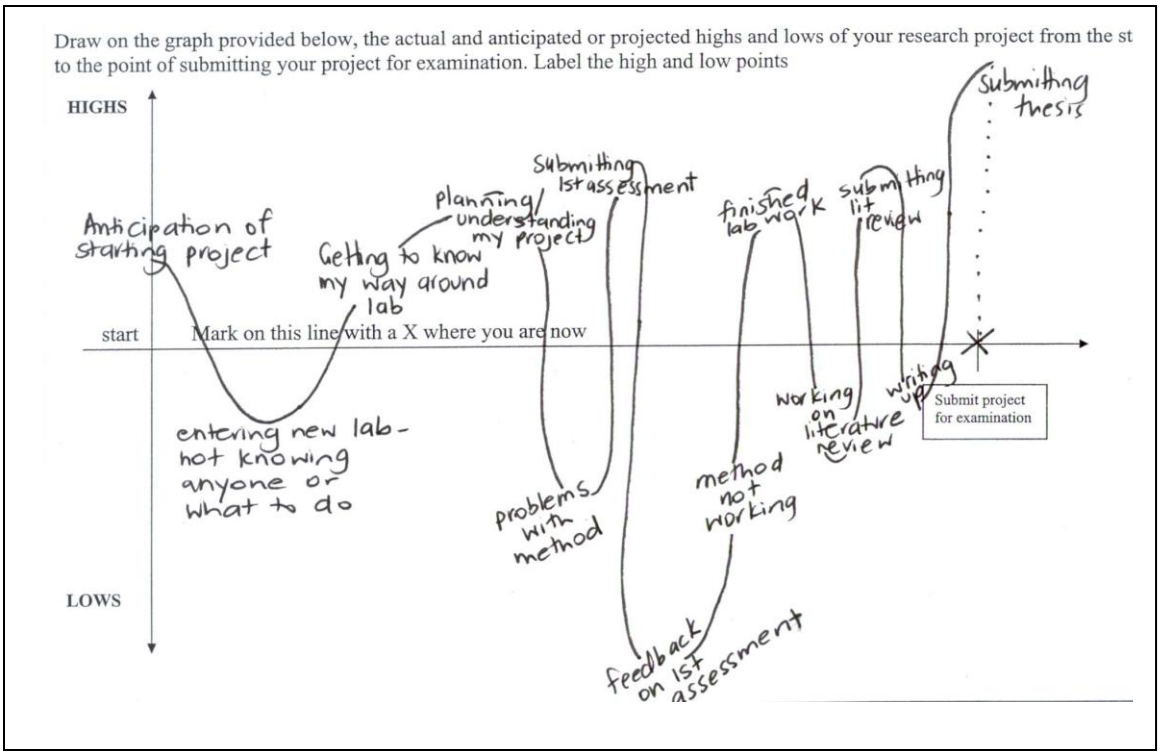

Figure 27: Journey Plot: A complex journey (Suzy)

Suzy's journey is shown (see Figure 27). It is interesting that she started with high expectations and that she finished on a high as well. This mirrored the mean plot for Honours students which also started and finished on a high. However, she did experience more than the average number of high and low points on her journey, making her journey more complex than others in her cohort.

Suzy's journey commenced with personal-based comments which she focused on for nearly a third of her journey. Although starting with positive anticipation, she quickly realised that she did not know what to do or how to make her way around the laboratory. She demonstrated knowledge of research process in the Plot, including Conceptualising, Early Tasks, Implementation and Presenting Results phases of her project. Her experience with the method, working on the literature and writing the thesis were low points, with the feedback gained from her first assessment being her lowest point. She found that the best part about the project was finishing major tasks such as the laboratory work and the literature review, and that her highest point was when she submitted her thesis.

7.8.3 A journey of dissatisfaction - Mary

Not all journeys reflected highs and lows, there were a few examples in the End-on group that showed that even when a student started research with a positive outlook, it was not all clear sailing. Mary's journey demonstrated how she kept changing the project when she perceived that it was not working, resulting in an intensely low event which consumed her journey. A closer look at this unusual journey may provide insight into contributing factors (see Figure 28).

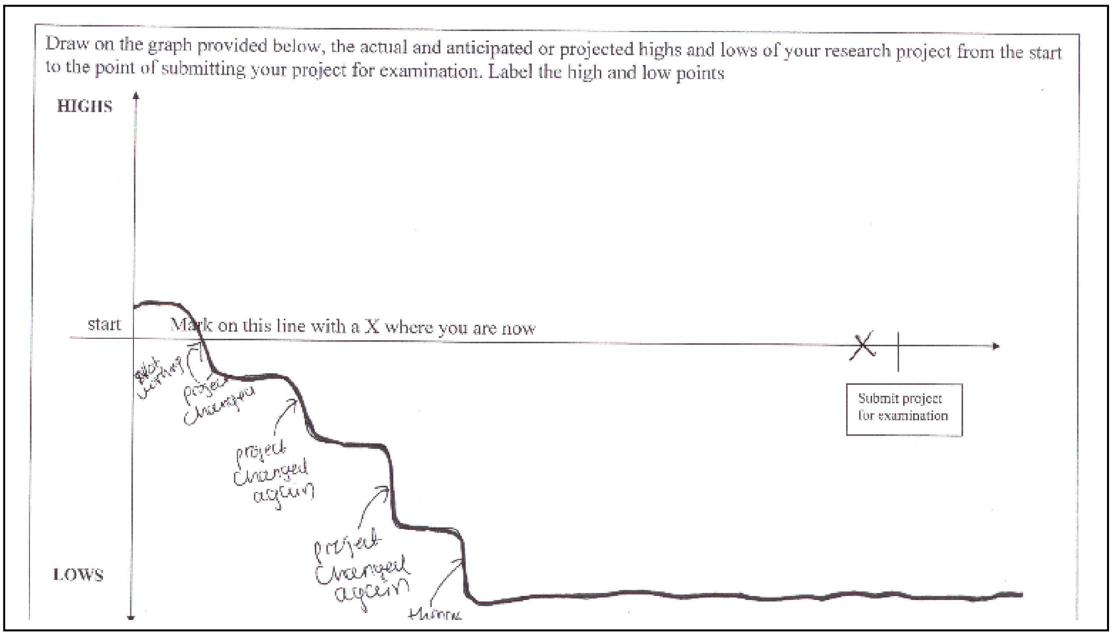

Figure 28: Journey Plot: A journey of dissatisfaction (Mary)

Mary was a female student aged between 21 and 24 years enrolled in a Bachelor of Forensic Science Honours program. She was an Australian student studying full time, and had continued on to study Honours without a break after completing her Bachelor of Forensic Science degree. She was financially supported by a scholarship and by her parents. Mary indicated that she chose Honours because it would enhance her job prospects. However, she also indicated that she was unsure if she would continue on to postgraduate research studies.

Her Honours program consisted of a 100% research thesis, and she indicated there was no specific training in research methods or approaches. Her research did not involve contact with industry or members of her profession. She indicated that she had no involvement in the choice of topic. The project methods were experimental, quantitative and laboratory based. When indicating the quality of her relationships with members of the university she indicated that other students 'were helpful and supportive', the faculty members were only 'a little helpful and supportive' and that administration personnel were 'not very helpful or supportive' at all.

A closer look at the data from the research environment scales shows that Mary was positive about the resources available to her such as library access and study areas within her School. However, she disagreed with Learning Community items such as talking to lecturers about problems she was experiencing and exploring academic interests with staff and students. She described the frequency of contact with her Supervisor as monthly, and did not feel that her Supervisor had expertise in her area of research. Her research did involve working with a research group, and items on the motivation scale regarding peer support were positive.

Although Mary tended to agree with items on the intrinsic motivation and self regulation scales, she was not as positive about her use of cognitive strategies in relation to her project. In particular, she strongly disagreed with the statement that she thought about the things she would need to learn before she began studying, which may have had an impact on defining her project as seen in the journey plot. This was followed by her response to items in the Research Self Efficacy scales, where she indicated that she did not feel very confident about developing a logical rationale, generating researchable questions, identifying areas of needed research based on reading the literature and obtaining approval to pursue her research. All these tasks were in the conceptual and early stages of research, which is where her journey plot indicated lows. Her perception was that she did not recover from these lows, even though she indicated that she believed her confidence with later stages of the project in the research self efficacy scales was higher. It is clear that the continually changing project had an impact on Mary's whole journey. This relates to findings in a study by Manthunga (2005a) where a preventive approach to timely completion of a research thesis was investigated. She found that one of the four warning signs for student experiencing difficulties in doctoral study was when a student constantly changed their topic or their planned work. This finding is also represented in this research journey of dissatisfaction.

Despite this unusually dissatisfied student who still in the end submitted her thesis, overall there was a feeling of positivity in the respondents from End-on Honours programs, particularly in the open comments section of the questionnaire.

7.9 Positivity

It is important to provide positive experiences of research. As has been shown with this group of Honours students despite some low points, there has been an overwhelming 'positivity' shown through investigation of aspects of their experience. In regard to their research environment, their perceptions of confidence with research tasks and motivation towards research, we have seen a positive outlook. In the journeys, students not only finish with a positive outlook on the whole, but also mainly come into the Honours year with a view of positivity, as demonstrated by the start and end points of the mean journey and the types of journey plots recorded.

Comments made by respondents in the open-ended section of the questionnaire also illustrated the 'positivity' of the connection. They were asked to contribute any additional information about their experience of fourth year, their research project or whether they would continue with postgraduate research studies in the future. Some 48% responded, and of these the majority were from the science disciplines. Most comments made were positive (90%) and mainly in relation to overcoming the challenges involved in the project. This demonstrated resilience of the students, which was also a key outcome of the Honours experience as indicated by the data in Phase One of the study.

> *All up this year had a lot of difficulties, but overcoming these made me feel like I achieved quite a bit (Science student – n222)*

> *I enjoy the challenges of research and overcoming problems when experiments don't work. (Science student – n227)*

Students also wrote positively about the skills they had developed, particularly in the Science fields. These comments picked up on a number of themes which emerged about the development of research skills in the Phase One data, including independence, motivation, and the management of their time:

> *This year has been very rewarding for a number of reasons. I have learnt a lot about managing myself and my time - I probably would not have learnt these things without Honours. (Science student – n 228)*

> *The time efficiency and motivation to do well is what I will take most out of this year. (Science student – n 233)*

> *I have learned many new skills, including time management, researching efficiently, lab skills and the ability to work independently. (Science student – n283)*

This cohort was particularly positive in relation to the learning community scale, and respondents who commented on this were predominantly from the Sciences.

> *Honours was a valuable experience for me and many friendships were forged. (Science student-n212)*

Honours was also a time of building networks within the field and making new friends. (Science student- n227)

I really enjoyed the challenge, working in a laboratory environment with other students. (Science student – n229)

I certainly appreciated having other students in my laboratory to support me and sympathise because it was tough. (Science student – n234)

The small number of respondents (10%) who had negative comments still viewed the experience in a constructive manner:

The research project was difficult for me. It made clear that laboratory science was not a career for me. I still have a passion for science but I will apply that to further study in a health profession – hopefully medicine/dentistry. (Science student – n233)

Wasn't exactly what I was expecting, although all the lows – eg experiments not working - I had heard about happened…In saying that I enjoyed it and will hopefully undertake a PhD next year. (Science student- n234)

Many were looking forward to a break in their study for financial or emotional reasons, but still left Honours with a view to continuing research:

I'm not going to start a PhD right away as I feel I need a break from studying (and I am a bit sick of being a poverty-stricken student) – I will work for a few years before I look at doing a PhD. (Science student – n221)

The main thing preventing me from undertaking a PhD at the moment is the money (or lack of) and the notion that a child may come along before completion of my PhD. (Science student – n212)

Maybe in two years time may consider doing a PhD, but at the moment I need a break as being at uni is stressful. I think cortisone levels have peaked past healthy! (Science student – n224)

Whereas others were even keener to start a PhD right away:

Research is something I want to continue so I have applied for a PhD. (Science student – n227)

I would love to do a PhD if it is possible. (Science student – n229)

I enjoyed it and will hopefully undertake a PhD next year. (Science student – n234)

I am going on to do postgraduate work. (Science student – n263)

As discussed in this section, students on the whole were positive about their research experience, both about the process and the environment. Students indicated an interest in undertaking postgraduate study, even if they needed a break before starting.

7.10 Summary

Respondents in the study completing an End-on Honours program were generally motivated to do Honours and confident about the research related tasks for all phases of the project. These students had a high engagement with the learning community, meeting frequently with their supervisor. A key factor which contributed to student's confidence in research tasks was the level of facilities provided to research students. This became more important as the project progressed, with confidence in presenting the results of their study being strongly related to the facilities provided.

Research groups were an important factor in their experience, with those involved in research groups more likely to be confident about implementing and presenting research, and to be self-regulated learners. Those respondents who indicated they belonged to a research group were more likely to have the intention to continue on to postgraduate research study. When considered by areas, Science students in this study were more likely to be part of a research group than Arts students.

A high proportion of students who participated in the study completed the Journey Plot, which predominantly showed a positive orientation toward research. Events which impacted positively on the journeys of this group of students were coursework and literature related tasks, with completion of the project receiving the most intense response from students on the whole perhaps with the feeling of jubilation that the project was at last complete! Although completing ethics and writing up the project were identified as lows, they had little impact on the journeys of the group as a whole.

The areas of concern identified in the journey plots for this cohort were in the conceptual phase of the project, namely formulation of the research questions and topic, which had a negative impact on the journeys of the students as a whole. This confirms findings by Todd et al (2004) who investigated the experiences of undergraduate research students in the UK who experienced challenges during the formulation of the research questions. The writing up of the project as an event was also an area of concern, though it did not impact in a major way on the journeys as a whole.

Personal events were generally positive on the journey, with most categories identified as highs. The only area of concern of a negative nature which affected the journeys of respondents was motivation, which was surprising considering the motivational scales were positive for this group. This indicates that although students responded positively to the items on the motivational scales for intrinsic motivation, self regulation of learning and cognitive strategy use at the end of their project they nevertheless self identified motivation as a negative event along their journey.

A closer look at some of the unique journeys of individual respondents demonstrated the rich data collected on student experience through the questionnaire. The first journey selected demonstrated an average journey for this cohort to further elaborate some of the details of the experience. The next journey illustrated one of the more complex plots, which showed the extent of knowledge which can be gained about the research process. The last journey selected was one of dissatisfaction, which illustrated one of the warning signs identified by Manathunga (2005a) for students who face difficulties with research. Although Mary started her journey with a positive disposition, the constant changing of topic led to a largely negative experience of research. These data add to the field of knowledge on the experience of students conducting fourth-year research, personalising the journeys of the students, and picks up on data found during Phase One of the study.

This group of students exhibited an overall positivity through the open-ended comments of the questionnaire, which added to findings from the scales and the journey plot, and point to the success associated with the End-on Honours program. This group of students is prepared to continue on to further research study, as shown by the high Research Preparedness Score for this type of Honours. The model leads to a higher intention to continue on to postgraduate research and a large number of students who are open to taking up that option but are as yet undecided.

8. FOURTH-YEAR PROFESSIONAL PROGRAMS

8.1. Introduction

This chapter draws on the Embedded Honours data from the questionnaires. As outlined in Chapter Six, the student questionnaire data is being reported in chapters organised by types of Honours program. Chapter Seven reported on the End-on or traditional Honours programs, whereas the data from the Teacher Research Projects are being reported as a separate group in Chapter Nine.

The programs included in this data set are from professional-based degrees, other than Education. The establishment of professional degrees in Australian universities is outlined in Chapter One, as a part of the background to this study. Professional degrees have been seen from an increasingly instrumentalist perspective after their introduction into Australian universities (Aldred et al, 1997). However, these changes have been accompanied by an 'explosion in knowledge' as industry is now competing with universities in the production of new knowledge which can be applied to the field (McWilliams et al, 2002). Completion of the research project in professional degrees is often a requirement of an external accreditation body involved in ensuring standards for professional graduate attributes, as reported in Chapter Four through the interviews with Coordinators. Progression into a research higher degree is not typically a driver of student motivation with this group given the shortage of professionals in the workplace and the high salary levels of graduates.

The dual role of Honours programs was outlined by Kiley et al (2009) as being either to prepare graduates for the workforce or for further research. The fourth-year research projects in Embedded programs attempt to fulfill both roles by being integrated as part of the professional undergraduate degree to give students an opportunity to apply the knowledge learnt during the program to a real-life problem. This process is akin to experiential learning, designed to prepare students for the complexities of the workplace. In many cases industry-based supervisors are appointed to co-supervise the research project to ensure that the project adheres to what is acceptable in professional practice and also so students can experience the heightened expectations of the workplace before graduation. In this sense the main aim of the research project is to prepare graduates for the workforce and to give them a step-up into areas in which they are interested in working after graduation. The example of benchmarking Archaeology Honours programs in Australia (Beck & Clarke, 2008) illustrates the role of Honours programs in preparing outstanding graduates ready to contribute to their profession. As demonstrated by the data presented in Chapter Four, the graduates from professional programs are highly sought after and are offered competitive salaries on graduation. It is important that they are equipped with advanced knowledge and skills for their profession.

There is less emphasis in the literature on the role of fourth-year Honours in preparing students to continue on to further research studies, thus creating new knowledge through scientific investigation. The emergence of professional doctorates has seen a change in how academic identity is perceived at a doctoral level (McAlpine & Hopwood, 2006; Usher, 2002) and whether we should be aiming for more generic attributes for doctoral graduates (Gilbert et al, 2004; Crasswell, 2007; Malfroy, 2005, Boud & Tennant, 2006; Fenge, 2009). Indeed it is sometimes argued that most new knowledge within the professions is produced in practice, hence the justification for professional doctorates (McWilliams et al, 2002). Of less emphasis is what research preparation is given to students by the inclusion of the research project in four-year professional degrees, and how that experience compares to one-year Honours programs. This is an important issue given that students in professional degrees are able to graduate with First Class Honours and continue straight into a PhD program. It is also an area which requires further investigation given the decreasing number of academics who will be available to teach our future professionals (Hugo, 2008; Bradley et al, 2008).

The investigation of the research preparedness of the students from Embedded Honours programs is a focus of this chapter. For the four-year professional degrees in this study, the role of the fourth-year research project varied significantly, compared to the traditional Honours year which had a fairly similar role in terms of research training for students who had achieved good results in their Bachelor degree. The research projects in these fourth-year programs were offered to students as a single course or a series of courses, for which students were either selected or invited to participate on merit or were a compulsory part of the accredited four-year professional program.

For some disciplines such as Speech Pathology, the research project was available only to a specialised group who had achieved well in the first two years of their program. However, other programs were offered to fourth-year students from a number of different specialisations as a part of their accreditation requirements to complete an industry-based research project, particularly in Engineering.

In all programs in this group, the research thesis was embedded into the four-year program, with the awarding of a Bachelor degree with Honours dependent on the grade point average of the student across either the final year or a number of years of the program rather than solely on the quality of the research thesis. The thesis component varied between 25% and 50% of the final year load and in a number of the Engineering specialisations the project also included a practical component.

The findings from the student questionnaire are reported in this chapter in relation to the Embedded Honours students. Apart from a general overview of the participants from the Embedded Honours programs, there will also be an emphasis on how motivated and confident the students were about doing research and what their research environment was like. In particular their research experience will be explored in terms of the milestones they self identified along their journey, and what they perceived as the highs and lows. The intention to undertake higher degree research studies will be explored, and whether students felt they were ready to undertake further research. The next chapter will then report in a similar manner on the findings from the Teacher Research Project cohort.

8.2 Demographic information

The 75 respondents represented 64% of the students enrolled in the Embedded Honours programs that participated in the study. Engineering constituted the largest group (61%) followed by Speech Pathology (23%) and Built Environments (16%).

There was a predominance of males in this group (67%), because of the large proportion of the group in the areas of Engineering and Built Environments. The female students were found mainly in the Speech Pathology program. The majority of students (83%) were aged 21-24 years and studied full time (96%). Students typically financially supported themselves through government financial assistance Centrelink (53%); part time employment (42%); and the support of family and friends (34%).

The questionnaires were distributed to fourth-year students at the end of their second semester of study, after the final seminar, where students presented their thesis to their peers and to academic staff in their discipline or School. Students had predominantly finished their theses at this stage of the year, and so were able to reflect on their experience.

The primary intent was to collect data that captured all stages of the research process, and to obtain a perspective on positive or negative orientations to the different elements of the process. To achieve the latter a 'journey' plot was incorporated as the final section of the questionnaire. The plot was completed by 71% of the students who responded to the questionnaire.

The questionnaire asked for demographic information, as reported in Chapter Three, about the respondent; information about the structure of their program, and details about the research project. It contained items grouped in the areas of research efficacy, research environment, learning motivation and research orientation. The learning motivation, research self efficacy and research environment areas were developed from existing scales and the literature on undergraduate research student experience. The fourth area, research orientation, drew on the visualisation of the journey.

The theoretical background of the areas and scales are also outlined in Chapter Three and are referred to as the results are presented. All three scales have a series of statements where the respondent was asked to indicate on a six-point Likert scale the extent of their agreement with the statement, from Strongly Disagree (1) to Strongly Agree (6). A score of 3.5 on such a scale indicated neither agreement nor disagreement.

8.3 How motivated were students to research?

Access to students completing Honours programs provided a valuable opportunity to explore how students reacted to the demands made of them to become independent professional learners in a research and training context. But how motivated were they?

Three areas of motivation were explored – Intrinsic Value, Self Regulation and Cognitive Strategy Use. The scale descriptors and characteristics are shown in Table 46 for the overall group completing their research project through the Embedded Honours program and by degree.

Students on the whole were motivated to complete their research project, with the means for the overall group of all three scales falling between 'tend to agree' and 'agree'. The scale of Intrinsic Motivation was highest for students from the Civil Engineering, Speech Pathology and Environmental Engineering programs showing means falling between the 'agree' to 'strongly agree' range.

Students from the Surveying and Civil Engineering programs showed the highest average Cognitive Strategy Use, although the means were in the same range as students from other degree programs. The Self Regulation scale, however, showed some variance across degree programs in their responses, with students from Speech Pathology, Chemical Engineering and Environmental Engineering showing means much closer to neutral and ‘tend to agree’. This is an interesting result for students from Speech Pathology and Environmental Engineering whose perceived intrinsic motivation was higher than students from other programs, whereas their perceived self-regulation strategies were lower than the other disciplines. There were no significant differences between degrees for any of the learning motivation scales.

Table 46: Learning Motivation scale characteristics by Degree (n =75)

Degree	Number of respondents	Intrinsic Value Mean (SD)	Self Regulation Mean (SD)	Cognitive Strategy Use Mean (SD)
Speech Pathology	17	5.07 (0.5)	3.95 (0.9)	4.38 (0.7)
Chemical Engineering	22	4.81 (0.5)	3.94 (0.8)	4.41 (0.6)
Construction Management	11	4.34 (0.7)	4.27 (0.8)	4.14 (0.7)
Surveying	2	4.88 (0.2)	4.50 (0.1)	4.75 (0.1)
Civil Engineering	15	5.08 (0.5)	4.63 (0.6)	4.72 (0.6)
Environmental Engineering	8	5.00 (0.4)	3.97 (0.5)	4.53 (0.6)
Overall group	**75**	**4.88 (0.6)**	**4.15 (0.8)**	**4.45 (0.6)**

8.4 How confident were students in carrying out research tasks?

Four areas measuring student’s confidence in carrying out research tasks were explored: Conceptualisation; Early Tasks; Implementation; and Presenting the Results. The means for all four scales fall between ‘tend to agree’ and ‘agree’, indicating a tendency for students in this group to feel confident about the research tasks they carried out in their projects, as shown in Table 47.

Table 47: Research Self Efficacy characteristics by Degree (n =75)

Degree	Number of respondents	Conceptual	Early Tasks	Implement	Presenting the Results
		Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Speech Pathology	17	4.58 (0.7)	4.36 (0.7)	3.89 (0.8)	3.94 (0.9)
Chemical Engineering	22	4.64 (0.6)	4.57 (0.6)	4.65 (0.7)	4.58 (0.8)
Construction Management	11	4.80 (0.7)	4.71 (0.8)	4.93 (0.6)	4.86 (0.6)
Surveying	2	3.30 (1.8)	3.50 (1.8)	3.50 (2.1)	3.10 (1.8)
Civil Engineering	15	4.68 (0.5)	4.71 (0.6)	4.57 (0.5)	4.71 (0.6)
Environmental Engineering	8	4.30 (0.4)	4.58 (0.5)	4.23 (0.6)	4.59 (0.3)
Overall group	**75**	**4.58 (0.7)**	**4.54 (0.7)**	**4.42 (0.8)**	**4.45 (0.8)**

The respondents from the Embedded fourth-year programs generally were confident with all research tasks undertaken in their research project. Most respondents in this data set indicated they felt more confident with conceptual tasks such as brainstorming ideas for the literature and early tasks such as generating researchable questions, particularly those students from the Construction Management and Civil Engineering programs. Students tended to feel slightly less confident as a group with tasks such as choosing the appropriate data analysis techniques and presenting results such as interpreting and understanding statistical printouts. However, the mean scores for Speech Pathology students were slightly lower in these two areas indicating less confidence in carrying out the tasks at the implementation and presentation of the projects than other students. The two Surveying students indicated they felt less confident with all aspects of the research process. However, the standard deviation indicated a variance in responses indicating that one of the respondents was an outlier from the group as a whole. There were no significant differences between degrees for any of the research self efficacy scales.

8.5 Did the Research Environment support the students?

Students felt positive about their motivation to complete the project and tended to be confident in the tasks required. Nevertheless, were they ready for the essentially independent research experience of setting up their own project, and did they feel well-supported? Two scales were developed to investigate – the research support scale and the learning community scale.

Table 48: Research Environment scale characteristics by Degree (n = 75)

Degree	**Number of respondents**	**Learning Community** Mean (SD)	**Research Support** Mean (SD)
Speech Pathology	17	4.31 (0.5)	4.17 (0.6)
Chemical Engineering	22	4.16 (0.6)	4.43 (0.7)
Construction Management	11	3.68 (0.8)	4.00 (0.6)
Surveying	2	3.92 (0.4)	4.30 (0.1)
Civil Engineering	15	4.46 (0.6)	4.61 (0.6)
Environmental Engineering	8	4.02 (0.9)	4.29 (0.9)
Overall group	**75**	**4.06 (0.7)**	**4.33 (0.7)**

Respondents agreed with items in the Learning Community and Research Support scales, with means falling between 'tend to agree' and 'agree', as shown in Table 48. Students from this group on the whole felt attached to the faculty or university community, and felt positively about accessing the academics in the School to share ideas and to discuss problems with their research they might be experiencing. They felt that they had a positive research environment, in terms of access to resources, services, and networks on campus. Students in the Construction Management program, however, felt less connected with the learning community in particular, scoring close to neutral on this scale and only tended to agree with the resource support scale. This indicates that these students felt that they were not as supported as other disciplines in the Embedded Honours group. In terms of both the Learning Community and Research Support scales the students from Civil Engineering felt they had the most support within their research environment. There were no significant differences between degrees for any of the research self efficacy scales.

Respondents were positive towards the statements forming the Research Support Scale. Indeed, on the whole, the students who completed the questionnaire indicated that they felt that they had access to ‘some’ (52%) or ‘a lot’ (41%) of the facilities required for their research. Clearly overall, this group of students felt supported by the university to complete their research project, although there is room to further improve the support in these areas.

8.6 Learning Community

Another aspect of the Learning Community was the support given by academic staff as supervisors. The majority of students in this group had one supervisor (83%) whom they felt had a lot of expertise in their field of study. The majority of supervisors were male (71%), with a small proportion of students who had both a male and female supervisor (6%). Students indicated they had a high level of contact with their supervisor, with 56% meeting either daily or weekly with their supervisor, and a further 29% meeting fortnightly.

It was not uncommon in these programs for supervisors to link students with an industry expert in their field of study. As outlined in Chapter Four, it was difficult for academic staff supervising students to be experts in all aspects of the field, and so at times they would draw upon expertise from members working within the industry or profession. In some instances, students would seek out a project in the specialisation in which they were interested or be allocated a project where they would need to engage in the industry or produce something for a client as a part of their project. This was illustrated in the example where a student completing his research project in Engineering was paid for eight hours a week during his fourth year to produce a product, giving the student essential experience working to industry specifications and a deadline.

In the questionnaire, students were asked to indicate whether their research involved contact with industry or members of their profession. Most respondents (67%) indicated that they did have contact with the industry during their research project. However, it was not typical for respondents from Embedded Honours programs to work as a part of a research group (30%).

8.7 Intention to continue to postgraduate research

The majority of respondents from the Embedded Honours programs did not have the intention to continue on to postgraduate research studies (59%). A proportion were open to the experience, with 29% indicating that they were uncertain whether they would continue and 12% indicating that they did intend to go on.

As indicated by the Coordinators of these programs in Chapter Four, the demands for graduates in these areas are high. This makes it less likely that students would forego the significantly higher salaries available in the industry to stay at university to pursue further research. Given the limited employment opportunities for students with PhDs in these fields, further research studies would be likely to ultimately lead into an academic career.

8.8 The Research Journey

The shapes of the journey plots that were recorded for this group of students were varied, indicating that they differed in their dispositions towards the research project. The types of plots show that student's initial dispositions towards the research and also how they felt at the end of the project. The start and end of the plot were noted as positive, neutral or negative in nature. Table 49 shows the types of plots, in descending order of frequency.

Table 49: Types of Journey Plots (n=50)

Type of Plot	Frequency	Percent
Neutral start, Positive finish	16	32
Neutral start, Neutral finish	10	20
Negative start, Positive finish	9	18
Positive start, Positive finish	9	18
Negative start, Neutral finish	3	6
Negative start, Negative finish	2	4
Neutral start, Negative finish	1	2
Positive start, Negative finish	0	0
Positive start, Neutral finish	0	0
Total	**50**	**100**

Investigation of the types of journey plots demonstrates that the majority of Embedded Honours students started their journey with a neutral (54%) or negative (28%) disposition. Although only a small proportion started with a positive, most students finished the journey with a positive disposition (68%), rather than a neutral (26%) or negative (6%) one.

By graphing the intensity of each event by the duration of the fourth-year research project on a scatterplot a visualisation of the average journey plot for the Embedded Honours students was possible.

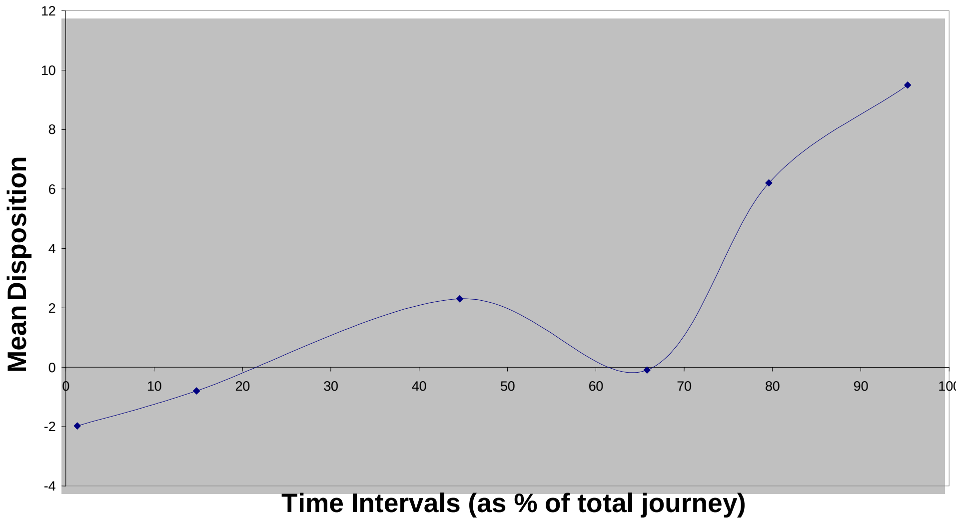

Figure 29: Average Journey Plot – Embedded Fourth Year

One can expect by looking at this average plot that for Embedded Fourth-year students the majority of the journey was spent with a positive disposition (see Figure 29). On average, however, students started with a negative disposition (Time 0), moved to a higher position (Time 40-50), then to a low (Time 60-70) and finished on a very high note (Time 90-100). On average, the respondents from the Embedded Honours programs were not as positive at the beginning of the journey compared with other groups. How did this affect their preparedness to continue on to further research studies?

8.9 Research Preparedness

It is clear from the findings for this group of students that many started with a neutral disposition towards research. Given that for most students in this group the research project was compulsory, in a busy final year, this ambivalence towards the research project was understandable. In addition, the majority of this group had no intention to continue on to further research study. Given the impetus for professional graduates to be involved in the production of new knowledge (McWilliams et al, 2002), whether in the workplace or in an academic setting, the preparedness for these students to continue to research is of interest.

The Research Preparedness Score (RPS) devised for this study comprised the motivation, research self efficacy and research environment scales already reported in this chapter. It also combined the student intention to continue on to further research studies, the type of start students had to their undergraduate research journey and the quality of relationships formed with academic staff. The reliability of the RPS scale developed was 0.867. Further details of the scale characteristics including the factor loadings are reported in Chapter Six.

Table 50: *Research Preparedness Score* characteristics–Embedded

Degree	Number of respondents	RPS Mean (SD)
Speech Pathology	17	15.93 (1.7
Chemical Engineering	22	16.08 (1.5)
Construction Management	11	16.06 (2.2)
Surveying	2	14.75 (1.8)
Civil Engineering	15	16.89 (1.3)
Environmental Engineering	8	16.10 (1.3)
Overall group	**75**	**16.18 (1.6)**

The RPS for students from Embedded Honours programs ranged between 14 and 21, with a mean of 16.18 (see Table 50). Those students with a higher RPS were in Engineering, with students from Civil Engineering feeling most prepared to carry out research. The students from Surveying programs showed the least preparedness for research, however, there were only two respondents from this group. In terms of the two main types of programs represented within this group, Engineering and Speech Pathology, there were no significant differences in the RPS. This indicated that the high RPS was more likely due to the type of Honours program rather than the disciplinary approach. The mean was not as high as respondents in the End-on Honours programs (17.36). Thus although the Embedded research program generally prepared respondents for further research, they did not perceive that they were as well prepared as the End-on Honours students.

Table 51: Comparison of Means for Embedded Honours Students: Research Preparedness Score (RPS) and Contact with Supervisor (n=54)

	Low Contact		**High Contact**		**T-Test and probability**
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**	
Research Preparedness Score (RPS)	4.09	(0.70)	5.07	(1.36)	t=3.60, p=0.001

On the whole, the End-on Honours students felt prepared for research. However, for this group of Embedded Honours students, those who met more frequently with their supervisor were more likely to exhibit preparedness for research as shown in Table 51. The supervisors for this group of students were not just from the university, but were also from industry, illustrating that more contact with research experts would result in a higher felt preparedness to engage in research. This is an important finding for promoting scholarship within the professions as a whole, and is an area that would benefit from further enquiry.

In the next section, the journey plot is examined in a wholistic manner to elucidate the overall experience for this group of students. Then some of the specific journey plots are examined in detail to add depth to the journey from the fourth year Embedded research student's perspective.

8.10 Student experience of the Journey

8.10.1 Complexity

A phase occurred every time the x-axis was dissected by the self-drawn path, and this measure gave an indication of the level of complexity of each journey. For example the average plot shown above has three phases. The range of complexity for this cohort was between 13 and 2, showing that some respondents were quite detailed in their response to this question, identifying a number of events along their journey, whereas others had identified only one event along the journey.

8.10.2 Event Intensity and Impact on the Journey

The path was unique to each respondent, as were the labels used to describe their highs and lows. These labels are referred to as Events in the student's journey. The labelling of Events along the path was open-ended and was coded to two different categories during analysis – Task Related and Personal. A description of the measures of Impact and Intensity are given in Chapter Six.

The combination of the scales of Intensity and Impact presented a powerful measure, particularly when also compared with the confidence scales of research self efficacy for the task related events. This data provided further triangulation of the data, and also added to the depth of student experience.

8.10.2.1 Task-related events

Task-related events were investigated through the level of intensity of each event (see Figure 30) and the overall impact the event had on the journey of the respondents as a group (see Figure 31). The responses to the Intensity measure ranged from -20 to 21 indicating a wider range of responses in terms of the highs and lows for each particular task-related event than the End-on Honours group which ranged from -8 to 17. The measure of Impact gave an indication of the how the task-related event impacted on the whole journey of this group, in comparison to other events, and these responses ranged from -349 to 607.

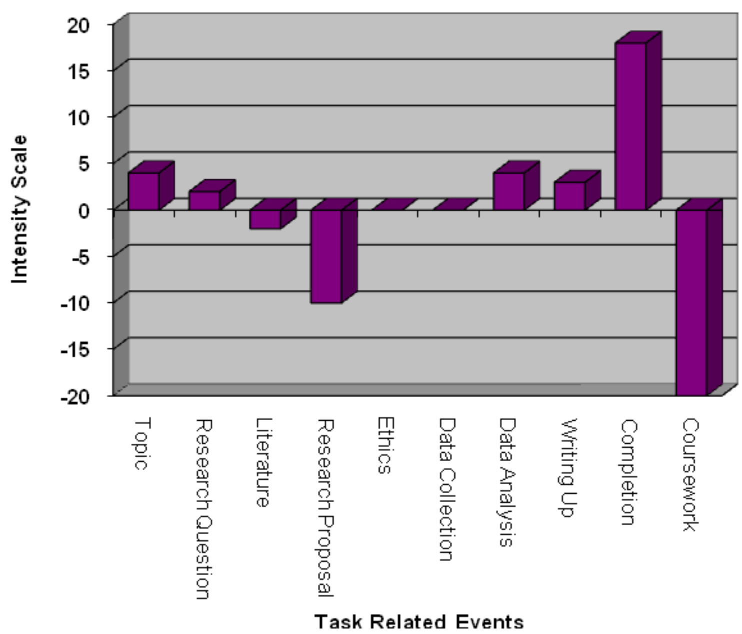

Figure 30: Intensity of Task-Related Events for Embedded Fourth year programs

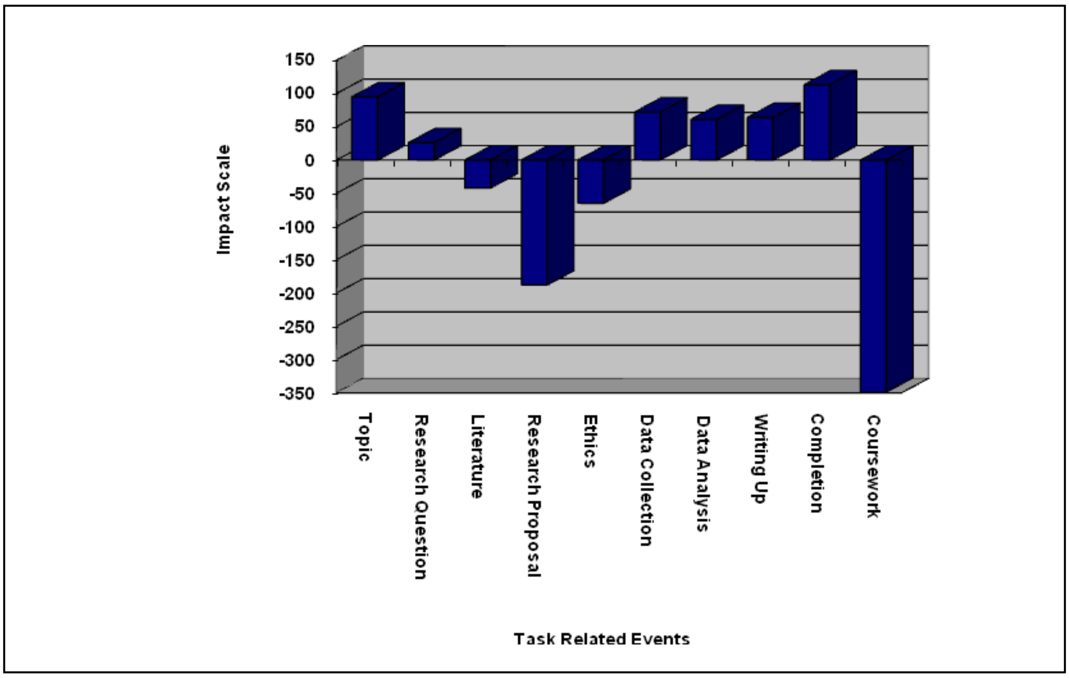

Figure 31: Impact of Task-Related Events for Embedded Fourth year programs

Students who completed their fourth-year research project indicated that Coursework (-749) on average had the strongest negative impact on their Honours journey. This finding indicated that the coursework provided to students on the whole had a negative outcome on their research journey. This was similar to the finding on the Intensity scale, where Coursework (-20) was also one of the most negative task related events. The research proposal was identified as another area of concern, both in terms of the intensity of the event itself and the negative impact made on the journey, indicating that it was a hurdle which many of the respondents found challenging. This area was found to impact the commencement of the student's journeys, causing an overall negative disposition at the start of the project.

These results indicate that coursework and the research proposal in the fourth-year research project have contributed to a negative disposition in students about these particular research tasks and are concerning events along their journeys. Although the research topic was found by some to be a concern, on the whole it was relatively high on the intensity scale and had a positive effect on the overall journeys of the respondents, as did the formulation of research questions.

Clearly completion of the research project had a strong impact on the journeys of the students and was also an overwhelmingly positive event on the Intensity Scale, so the majority of respondents finished their journey with a positive outlook as was reflected in the types of journey plots recorded earlier in the Chapter.

8.10.2.2 Personal events

Personal events that were experienced by this group of students included motivation, connection with the research environment, and also the expectations and feelings expressed about their project.

In terms of the Intensity scale, shown in Figure 32, respondents were on the whole intensely positive about the Resource Support provided by the university (+12) and also positive about the Learning Community. This reinforced positive findings reported from the Research Environment Scales of Research Support and Learning Community as reported earlier in this chapter. These events also had a strong positive impact on the student journeys as a whole, as demonstrated in Figure 33. Resource Support and Learning Community were clearly major components of the journey in terms of both the intensity of the response and the impact on the journey as a whole.

Motivation also had a positive impact on the journey of the respondents and, in addition, respondents reflected motivation as a high on the Intensity Scale. This supported findings from the Motivation scales reported earlier, where respondents agreed with the statements about motivation towards the project showing that on the whole they were ready for the intellectual challenges and were intrinsically motivated to complete their projects.

Respondents were overall negative in their Feelings and Expectations towards research for both the Impact and Intensity measures. In addition, Progress was a deep concern to a number of respondents, given the low intensity shown for the event. Progress, being negative, affected the journeys of the respondents as a whole, indicating feelings of disaster about how their project was progressing or as an indication that making progress on their research was difficult. These findings may be interpreted in conjunction with coursework, which will be investigated further in the comments made by fourth-year students later in this Chapter.

In order to investigate further the experience of students completing their fourth-year research project, some of the journeys were selected to demonstrate the individual nature of the experience. The journeys selected were not just from an ‘average’ journey, but were also some of the more unusual journeys within this type of program to illustrate the breadth of data and to further interrogate the data already reported.

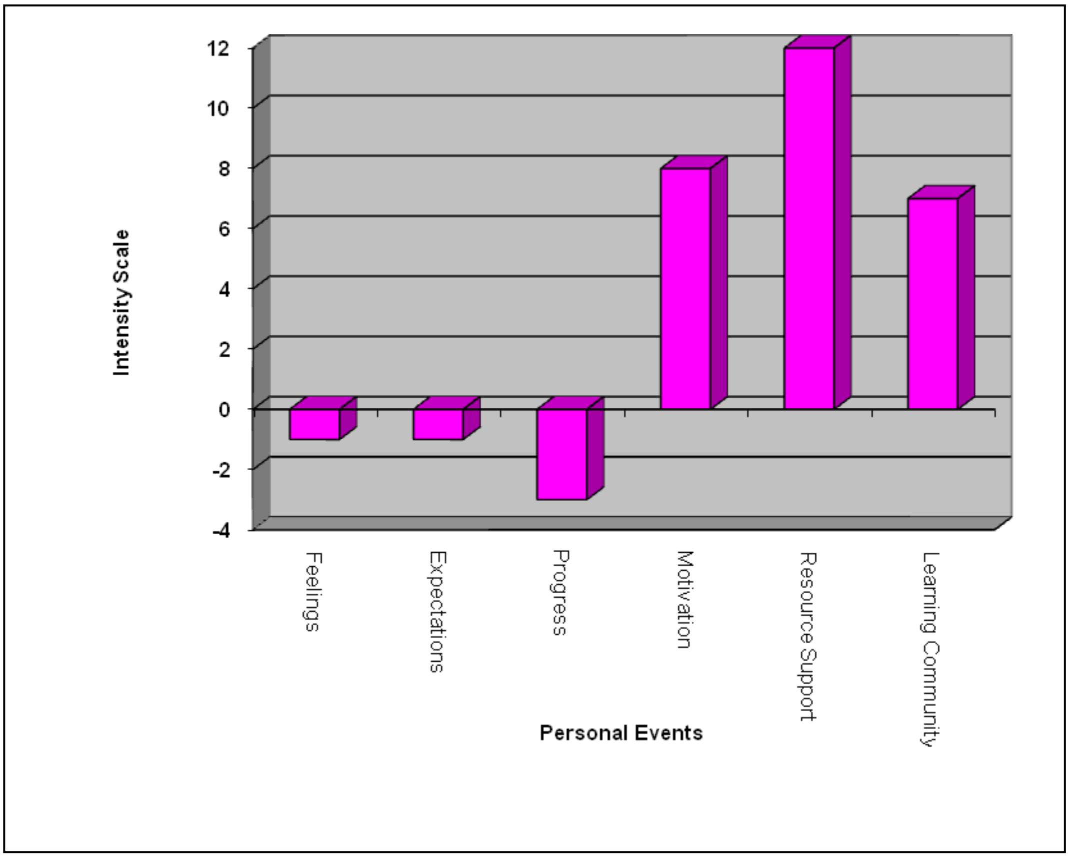

Figure 32: Intensity of Personal Events for Embedded Fourth-year Programs

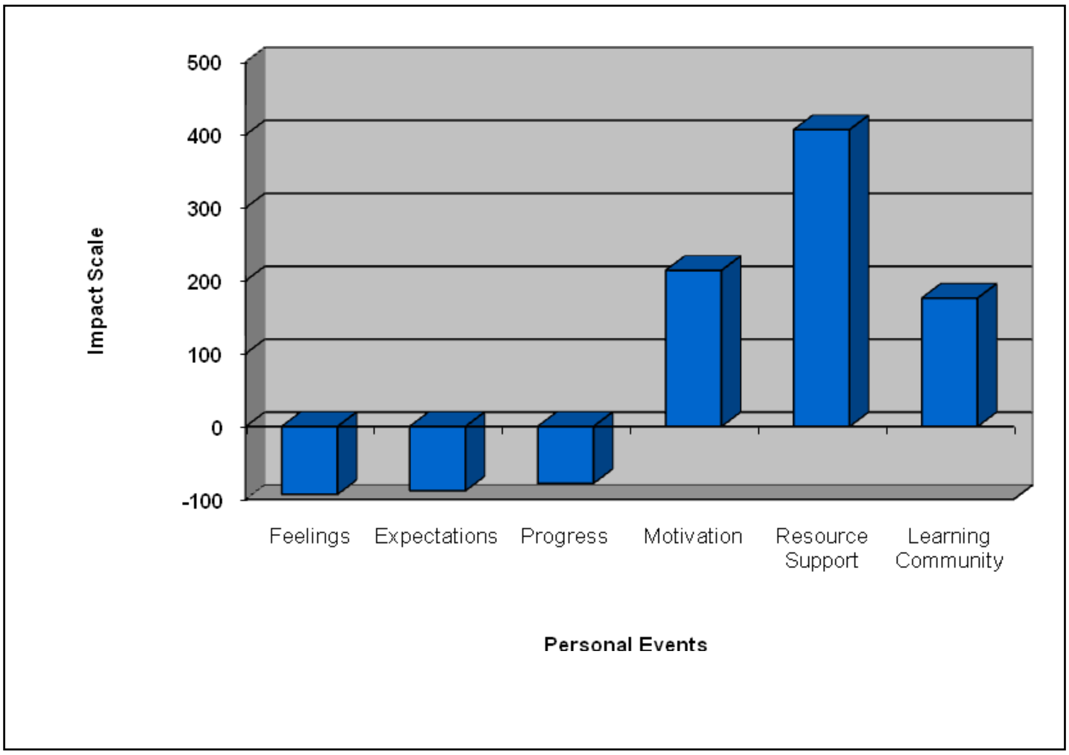

Figure 33: Impact of Personal Events for Embedded Fourth-year Programs

8.11 Illustrative Journeys

This section of the Chapter presents the information gathered about a selection of individual students and present profiles based on their journeys. The respondents for each journey shown are named to add to the personal nature of the experience.

8.11.1 A typical journey – Liz

The first example of a journey discussed here typified the experience for most of the fourth-year research students, as demonstrated through the mean journey plot shown in Figure 29. Liz commenced her journey on a positive and ended her journey on a positive event. She was an Australian female student aged between 21 and 24 years of age. She was enrolled full-time in the Speech Pathology program, and supported herself financially with a youth allowance, personal savings and part-time work. The factors which contributed to her choosing to complete Honours were a positive relationship with her lecturer who personally asked her to consider Honours and other students who recommended the course. She was unsure whether she would continue on to postgraduate research studies.

The fourth-year program included a 25% research project component and specific training in research methods in the form of literature review and Honours tutorials. The research project methodologies she used for her project were qualitative, consisting of observation and fieldwork. Her research involved contact with members of the profession, however, it did not involve working in a research group. Liz had a lot of involvement in the choice of topic for her research. She felt that the School provided some facilities to enable her to carry out her research project, including a computer laboratory and access to a work place linked to her profession.

Liz felt very motivated about the Honours project, with the means of all three scales falling between ‘tend to agree’ and ‘agree’. She also responded positively to items from the Research Support scale, indicating that she felt the resources available were adequate. Liz however disagreed with items from the Learning

Community scale, particularly recognising that she did not feel that she belonged to the university community or to student groups. She indicated that she felt isolated when carrying out her research.

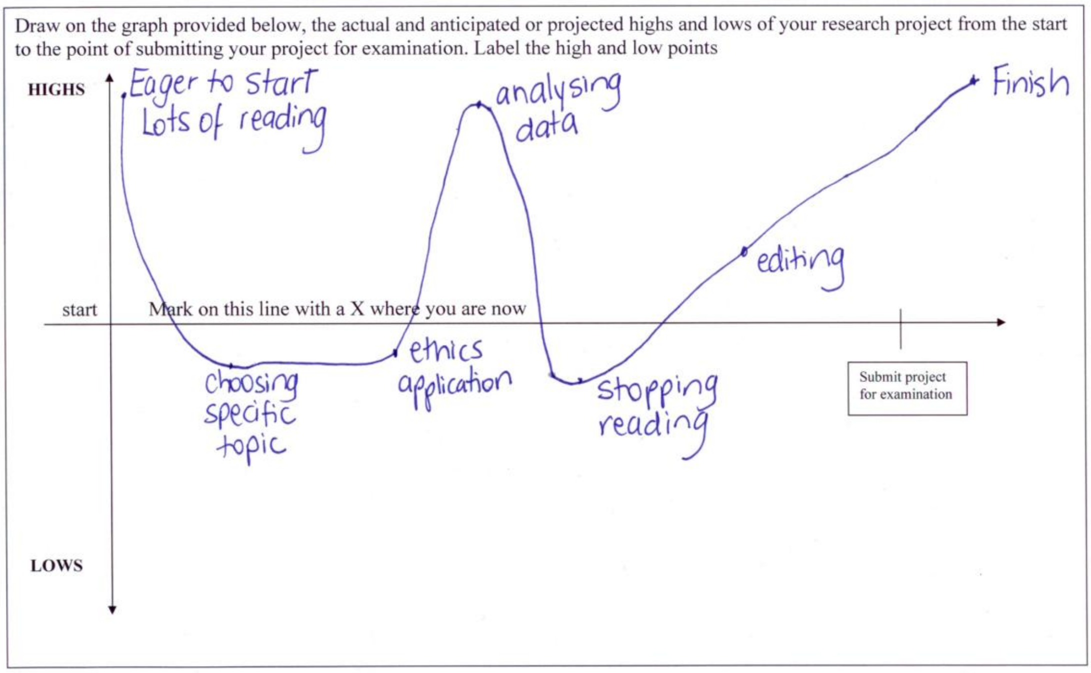

Figure 34: Journey Plot – A Typical Journey for Embedded Honours (Liz)

Liz started her journey on a high, eager to start with lots of reading, as shown in Figure 34. She then experienced difficulties firstly in choosing her topic, and then in completing her ethics application. She found analysing the data was a very positive event although she then identified difficulties with 'stopping reading' nearing the end of her project. She finished on a high point after submission of her project. All events identified were task related, which was interesting as she had identified some personal factors through the research environment scales which may have affected her journey. Liz added comments at the end of the questionnaire that her research project gave her a good idea of the processes involved in research, although she was concerned about continuing on because she did not know enough about statistical analysis. She recognized that she would still need support from a senior researcher if she continued on to further research studies.

8.11.2 A disinterested journey - Steve

Steve was a full time Australian male student aged between 21 and 24 years of age, studying in the field of Chemical Engineering. He supported himself whilst studying with his personal savings, and had no intention on continuing to a postgraduate research degree.

The research project made up 25% of the fourth-year load in Chemical Engineering, with a course in laboratory methods providing specific research training. Steve's research project involved contact with industry, however, did not involve working in a research group. Nevertheless, Steve did strongly agree with items on the learning community scale, indicating that he felt he belonged to the faculty community and had a close network of fellow students. He also strongly agreed that he had access to study areas within the School of Engineering. He had some involvement in the choice of topic for his research, and had a male supervisor with expertise in the area of research, whom he met with weekly. He had some facilities provided for his research, including access to science and computer laboratories. His main project methods were experimental and laboratory.

He was confident with most aspects of the research process, except those tasks related to the literature and organising of research ideas. In particular he identified ethics as a concern in the Research Self Efficacy scales indicating he was not at all confident with this task. His motivation towards the research project was not strong, with him only tending to agree with items on the intrinsic motivation and cognitive strategy use scales. In particular he tended to disagree with items on the self regulation scale, not thinking about the things he would need to learn before beginning or stopping once in a while to go over what he was reading. He also indicated that he preferred not to be challenged to learn new things.

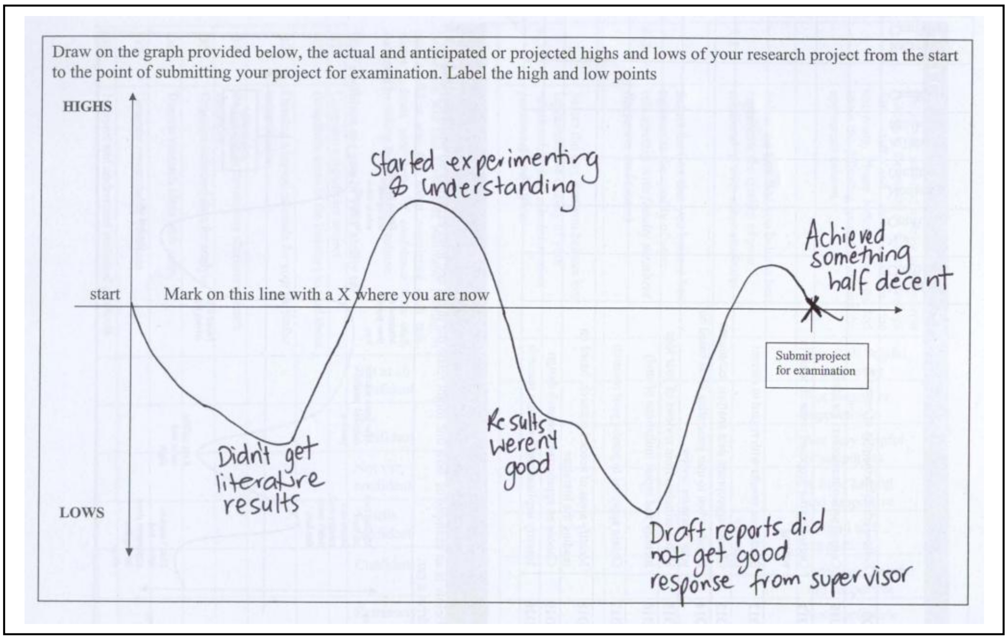

Figure 36: Journey Plot – A Disinterested Journey for Embedded Honours (Steve)

Steve started this journey with a neutral disposition, and also finished with a neutral disposition which was a type of journey taken by a number of respondents (20%) undertaking their fourth-year research projects. His journey plot, as shown in Figure 36, identified the literature as a low event which was reflective of his responses in the Research Self Efficacy scales. He also identified his results and the writing up of his research as low events along his journey, although he indicated confidence with these tasks when responding to the research confidence items. Completion of his project did not finish as positively as the majority of other respondents in this group, finishing on a neutral disposition having 'achieved something half decent'.

8.11.3 A journey of intent to continue: Katie

Katie was a female Australian full time student studying Construction Management aged between 21 and 24 years of age. She supported herself financially through youth allowance, family assistance and part-time employment. She decided to undertake the Honours research project because she wanted to graduate with First Class Honours and she had a desire to continue on to postgraduate research. A lecturer had also personally asked her to consider going on to Honours. She indicated that she still intended to undertake further postgraduate research studies and had applied for a scholarship.

Katie's research project involved contact with the industry and she felt that her degree program had prepared her to carry out research, although there was no specific course devoted to it. She had a lot of involvement in her choice of topic and was provided with some facilities by her School, including access to a computer laboratory and library resources. She met monthly with her male supervisor whom did not have a lot of expertise in her area of research. Katie's main project methods were quantitative, consisting of survey and statistical approaches. She was motivated to complete her project and felt that she had a positive research environment. Katie also indicated confidence about research tasks in all stages of the research project through the Research Self Efficacy scales.

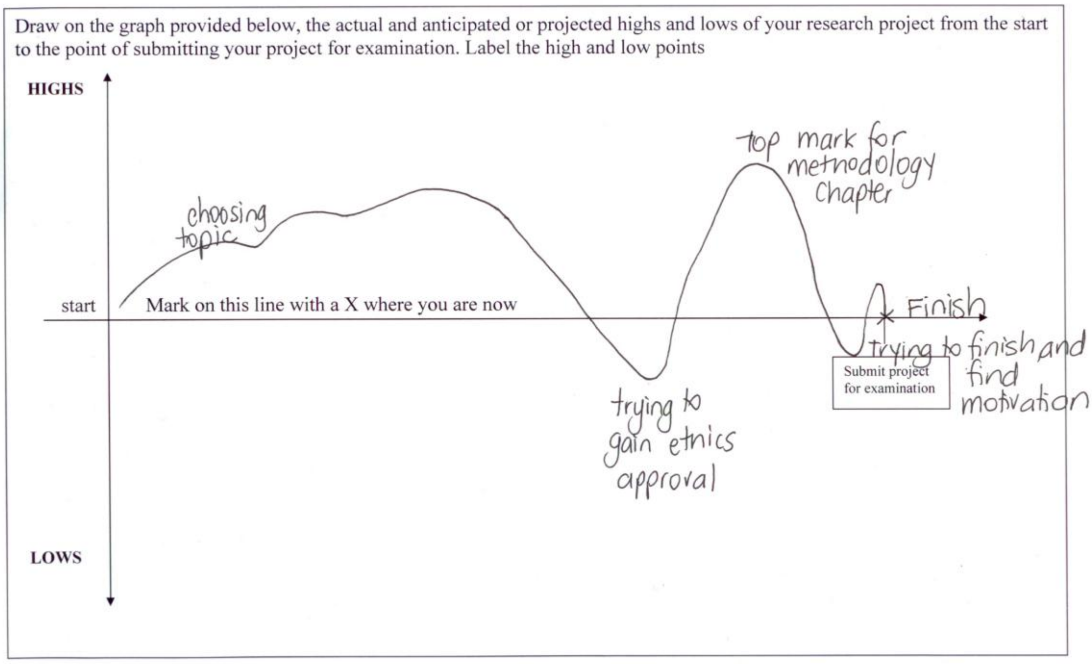

Figure 37: Journey Plot – A 'journey of intent' for Embedded Honours (Katie)

Events along the research journey predominantly had a positive impact on Katie's disposition towards research as shown in Figure 37. She identified choosing her topic as a high at the commencement of the project. Ethics was seen as the first low of her journey, which was a view shared by the majority of respondents in terms of the intensity of the event and the impact it had on the journey. Although for Katie the experience of Ethics was a low, it had minimal impact on her journey. Katie indicated her most intense high when she gained top marks for her methodology chapter, indicating that students were assessed along the journey and given feedback. She experienced difficulties at the end of the journey trying to find the motivation to finish. However, she finished her project with a neutral disposition.

In the comments section, Katie reiterated that she was aiming for First Class Honours and that she had already applied to continue on to postgraduate studies. Katie was in the minority of fourth-year students in this group as she had a strong intention to continue on to further postgraduate research studies. As was illustrated by the comments made at the end of the questionnaires, most of the students were keen to apply the skills they had learned in the work place.

8.12 Professional-based outlook

It is important to provide experiences of research, particularly in relation to industry for these students in their fourth-year of a professional degree. In regard to their research environment, their perceptions of confidence with research tasks and motivation towards research, we have seen a positive outlook. Comments made by respondents in the open-ended section of the questionnaire reinforced the link to industry and their enthusiasm to start working in their chosen profession. Students were asked to contribute any additional information about their experience of fourth year, their research project, or whether they would continue with postgraduate research studies in the future.

About a quarter of the group provided comments and, of these, the majority were female students from Speech Pathology (56%) with Engineering students making up most of the remainder (40%). Most of the comments made were positive and framed in a constructive manner when indicating there had been challenges along the way. This demonstrated the resilience of the students, which was also a key outcome of the research experience as indicated by the data in Phase One of the study. Students who faced challenges found the assistance of a supervisor important.

> *Research wasn't much fun. Started off slowly though and my supervisor helped me to understand it all and get some good results. (Engineering student – n197)*

> *The project gave me a good idea of the process involved…I am interested in going on to postgraduate research studies with the assistance from a senior researcher or supervisor. (Speech Pathology student – n167)*

Just over half of the respondents made comments related to the work place, giving an indication of the focus for a number of these students.

> *I won't be going on to postgraduate research – keen to get a job and start earning money. (Speech Pathology student – n 173)*

> *I am looking forward to the workplace. (Engineering student – n 284)*

A number of these students elaborated on how the skills they have learnt during the research project would be useful to put into practice within the work place.

> *The experience was a good one and I learnt things I can use in my future work. (Engineering student – n184)*

> *I am very keen to undertake clinical research within my workplace. (Speech Pathology student – n170)*

> *I would like to complete postgraduate research in the future but…I think I would need to work as a Speech Pathologist first so that I could find out which areas I am most passionate about. (Speech Pathology student – n172)*

And some commented how useful research is becoming within their profession, echoing the research by McWilliams et al (2002) that industry-based research is becoming more important within the field rather than in the universities.

> *I have no desire to continue to postgraduate studies at this time, however, I am aware that clinical work is gaining an increased focus on research. Therefore I think that research skills are essential in being a Speech Pathologist. (Speech Pathology student – n171)*

> *I would like to do some further research studies in the future perhaps as a part of a research team in the workplace, working with colleagues. (Speech Pathology student - n162).*

> *Fourth-year is a good initiation to 'real life' work but a very steep learning curve. There are great industry guest speakers and lecturers – I strongly recommend it! (Engineering student – n257)*

There were some negative comments. It seemed that some of the Speech Pathology students completed their research methods course with Psychology students, and were left comparing the two disciplines afterwards with a view that their discipline was not as well resourced as the other. They also suggested that Speech Pathologists needed specialised research training courses.

> *Need more specialised courses for carrying out research and statistical methodology, for example Speech Pathology students get lumped into Psychology research methods classes without the same background knowledge. Many of us struggled and didn't cement the principles of research. (Speech Pathology student – n293)*

I feel that compared other courses such as Psychology, our resources and funding are limited which impedes our ability to produce top quality research. I believe we still need training in research methods. I have found the research project very difficult. (Speech Pathology student – n168)

…as my research methods were qualitative I am concerned that I don't know anything about statistics. (Speech Pathology student – n167)

One of the Engineering students found it hard to balance the project with the rest of the fourth-year subjects, thus reinforcing the findings that coursework had an overall negative impact on fourth-year student journeys.

It was hard to balance the project with the rest of my course load. (Engineering student – n190)

Another student had troubles organising their data and found the experience as one they did not want to repeat.

I will not go on to further research because I have found out what is involved! Main problems I had were synthesising all available information and deciding what was relevant, getting sidetracked as I tended to 'idea-hop' from one idea to the other and organising the masses of data. (Speech Pathology student – n169)

The research project provided an opportunity for students to experience research within their undergraduate degree. As discussed in Chapter Five, some students seem to thrive on the research experience whereas others find out it was not for them. One student commented that they realised through the experience that they were not that interested in conducting research.

The course was OK. I am just not that interested in research. (Engineering student – n187)

Whereas another student found that they liked the whole experience of being self-directed in their learning, and the status it gave them as a fourth-year student.

> *The onus is on me. I like this. Being left to my own devices. Staff, especially my supervisors, are very helpful and go out of their way to be available. Fourth-year is about working at what you know. You are treated as almost a fellow academic, and you are left to apply what you know and learn about what you need to know. (Engineering student – n254)*

One student from the Construction Management program showed positivity and ambition after completing their project, indicating a strong intent to continue with their research.

> *I was aiming for First Class Honours, of which I still hope to get. I have applied to do postgraduate research studies next year. (Construction Management student – n209).*

As discussed in this section, students on the whole were positive about their research experience. However, there were areas that students felt required attention such as specialised research training in Speech Pathology and some students who were not ready to start working within their profession as yet. For those who experienced some challenges along their research journey, the support of their supervisor was important.

8.13 Summary

Respondents in the study completing an Embedded Honours program were on the whole motivated to do Honours and confident about the research-related tasks for all phases of the project. Although meeting frequently with their supervisor, their contact with the learning community was not as strong as those in the End-on Program. Industry was a key factor in the experience of these students, with the majority of those completing their research project having contact with members of their industry. The majority of students did not intend to continue on to postgraduate studies, with most students focused on the work force. The comments made by a small number of students, however, indicated that the research skills learned would be a valuable part of their work within the profession, particularly in Speech Pathology where clinical research was becoming more important to their field.

The majority of students who responded to the questionnaire completed the Journey Plot. The research journey typically started with a neutral or negative disposition for this group on the whole, nevertheless, they predominantly showed a positive orientation toward research towards the end of the project. Coursework in particular was an event which caused deep concern to many students in regard to their journey. As illustrated by data from the interviews with Coordinators of professional programs, fourth year was a demanding one for students in that they were often taking electives for their particular specialisations as well as continuing to extend their knowledge of the professional before graduation. Also, the expectations and feelings students had towards the research project had a negative impact on journeys overall. In many cases students completing a research project found it difficult to see the value within their demanding final year.

The areas of concern identified in the journey plots for this cohort were particularly in the early phases of the project. Namely the formulation of the research proposal and the completion of ethics-related tasks had a negative impact on the journeys of the students. The impact of literature-related tasks was also an area of concern to students identified by students along their journey, however, this area was perceived with confidence by students in the Research Self Efficacy scales. The comments from the Journey Plot relating to progress of the project indicated that some students felt the project was not running smoothly at different stages of the journey.

A closer look at some of the unique journeys of individual respondents demonstrated the rich data collected on student experience through the questionnaire. Those selected demonstrated a range of journeys, including an average journey for the Embedded Honours students. Steve's journey illustrated the experience of a student who was largely disinterested in research, with a neutral disposition at the beginning and end of the journey. He was focused instead on getting out into the workforce; nevertheless, he showed confidence in completing a range of research tasks. There was also the more unusual career path highlighted through the journey of Katie, a female student with a strong desire to continue to research in the area of Construction Management. These are some of the students whom universities need to engage in research to a greater extent than we currently do, if we are to alleviate the serious shortages of postgraduate research students in fields that are considered of national significance or where there is an identified skills gap (House of Representatives, 2008, p. 56).

This group of students from professional-based degrees exhibited a range of feelings towards the project through the open-ended comments of the questionnaire, displaying a balance of positive and negative comments. Most respondents in this section indicated that they were looking forward to finishing their degree so that they could use their skills in the work place. This reinforced findings discussed earlier that for professional degrees a research project provides skills which are seen as particularly applicable to the workplace as well as for continuing to research higher degrees. In this way the role of the Honours program differs from the more traditional model outlined in Chapter Seven.

However, the data from this study has uncovered preparedness for research in professional-based Honours students which has previously remained uncovered. This capacity for further research needs to be captured both to increase the numbers of students continuing on an academic career path and also to continue to raise scholarship within the profession. As outlined by a number of Coordinators of professional-based Honours programs, one outcome of Honours is to send out 'ambassadors of scholarship' into the profession to continue to raise professional standards. There is also a hope that students who leave with a positive experience of research may return to research later in their career to further contribute to the knowledge of professional practice. This was a theme particularly in the newer professional programs such as Speech Pathology, Design and Social Work.

9. TEACHER RESEARCH PROJECTS

9.1 Introduction

This chapter draws on the questionnaire responses of fourth-year Education students as they embarked on the research project based in their internship school. As discussed, these data are presented separately due to the significant differences in a number of variables, including intention and confidence in research tasks, from the data collected from students in other fourth-year integrated programs. It was also the case that the weight given to the research project in Education was less than that for other professional programs. The data were initially compared for significance due to the high number of respondents in comparison to other programs and the timing of data collection, which was mid-project in September, rather than at the completion of the project in November. As the data made some important discoveries, particularly in relation to the education of pre-service teachers which is currently of importance, it has been included as a separate chapter in the thesis.

In Education a large proportion of the research output is generated by research students (Holbrook, Ainley, Bourke, Owen, McKenzie, Misson & Johnson, 2000) and the numbers undertaking research degrees grew rapidly throughout the 1990s. While some education practitioners return to higher education to upgrade their skills and knowledge in a professional capacity through coursework or research, most do not. In education there is a continual undercurrent of questioning about the relevance and quality of educational research produced in universities (Holbrook et al, 2000, p.25) and on the whole the prevailing impression in the 1990s was that of an 'awful' mismatch (Kaestle, 1993). However, there is now a considerable body of literature that shows how teachers draw on research information and initiate, and take a partnership role in, projects (e.g. McMeniman Cumming, Wilson, Stevenson & Sim, 2000). Clearly, personal engagement and practitioners determining what 'counts' in school contexts is the key (Figgis, Zubrick, Butorac & Alderson, 2000). Moreover, the movement toward 'evidence-based practice' has gained momentum and is stressed in the context of professional excellence, school performance and systemic reform (James, 2006).

Research skills are generally seen to be essential for successful operation in a global knowledge economy (Davis, Evans & Hickey, 2006) and to sustain lifelong learning and professional development (Waite & Davis, 2006). Hence it is hardly surprising that the acquisition of such skills is deemed to be a valuable outcome of tertiary education, not least in teacher education. While academics argue as a rule that a general grounding in research skills and understandings at the undergraduate level will result in receptiveness to research and informed consumption of new information that carries through into professional life (Reis-Jorge, 2005), there are some who caution that the development of research skills works best for those motivated toward research (Diezmann, 2005) and not necessarily for all pre-service teachers. This is an important issue that needs to be further explored.

In teaching much has been made of the theory-practice gap over the years, and there are many courses that now seek to secure a cultural shift through providing direct involvement in research in undergraduate courses, but as yet the impact has not been adequately tested. We anticipate the results will be positive because we know that good teachers draw on research-based evidence to upgrade their working knowledge, but what of teachers as a group? How fragile is the 'connection' between exposure to, and engagement in, research activity at undergraduate level and future interest in research in Education? How do pre-service teachers respond to research experience, particularly the experience of undertaking a significant mandatory research project toward the later stages of their undergraduate degree? To what extent will this experience impact on their perception of the usefulness of research, their engagement with professional and academic communities, and intention to continue on to postgraduate study?

Fourth-year students in education were followed through the early stages of a school-based research project, and their projections about, and motivations for, involvement in future postgraduate study were looked at. Their preparedness to engage in research and the importance of their initial experiences in setting up expectations were explored.

9.2 Program description

The Research Project was a 10 credit point course (one-eighth of the fourth-year course) that students in all teaching specialisations within the double degree course were required to complete. The goal was to help students develop:

- An understanding of the nature of educational research and how it related to educational practice
- Skill in conducting a review of the literature on a specific educational topic
- Skill in comprehending, interpreting, evaluating and applying the findings of published research articles and other research reports
- An understanding of the basic procedures involved in research
- Professional Practice – the inclination to draw upon research findings when making educational decisions
- Skill in using evaluation research to investigate local educational problems

The Research Project was undertaken in conjunction with school internship. It was a requirement of the degree that students have 10 weeks of school based experience in their fourth year. The intern was responsible for up to 2/3 of the colleague teacher's teaching load in their internship school.

In the original design of the double-degree structure, students were required to complete a 10 credit point course Project Preparation in order to provide them with the required prior knowledge to complete their own research project. The content of this course included an orientation to educational research, types of educational research, preliminary skills needed for conducting research, locating published research, interpreting and summarizing published research and designing their own research project. Owing to competing demands in the double-degree curriculum, the credit points for the project preparation course were assigned to another area of the curriculum and the content of the course was incorporated into the Research Project. This move to incorporate two courses into one had significant ramifications for the student's workload in the course (essentially 20-credit-points of work were compressed into a 10-credit-point course).

In order to minimise the impact of this development on student workload, the students were provided with the opportunity to begin independent preparation for the Research Project in the previous semester and administrative arrangements were put in place to make this possible. Students registered in a supervisor's group (the average group size was between 10 and 20). All supervisors had a postgraduate qualification and specialist knowledge of the research process. Students chose specific supervisors because they had worked with them in previous courses during their double degree programme, or because of their particular research interests (these interests are listed on each staff member's web page). During one of the examination weeks at the end of Semester One, students were required to participate in a compressed delivery of the project preparation course. This consisted of one 2-hour lecture covering an introduction to the purpose of the project and the supporting resources for the course and another 2-hour lecture on the literature review. Students were then expected to complete required readings on research methods and other aspects of research such as validity and reliability. A blackboard site/Web CT was set up for the students containing information about the requirements of the Research Project, preliminary reading and self-testing tasks to cover the course content.

After the completion of these tasks, students were required to prepare a one-page written proposal for their Research Project. The proposal included an outline of the problem/question/hypothesis, theoretical framework, method and the project's educational significance. After preparing the proposal students were required to contact their supervisor to discuss the proposal and refine or modify it. These discussions sometimes resulted in a change of focus for their project or a different question. Students were always encouraged to choose a topic that they were interested in. Some students asked their internship school if there were any research areas that the school would like to address and as a result the student may have tapped into this (e.g. an evaluation of the school's bullying policy).

Frequency of contact (face to face, e-mail, telephone) with supervisors was for the most part student initiated. Some supervisors held informal group meetings on the scheduled days for the internship course meetings on campus. The opportunities for contact and discussion with the group/individuals and the advisor were limited, because of the workload demands of internship and, for many students, the additional responsibility of part-time employment. As a result of the many demands on students during this period the opportunities to seek support and develop a supportive network within a collegial research environment in the School of Education were also limited.

After the course, students whose work was considered to be of high quality (awarded a Distinction or High Distinction) were invited to consider postgraduate study informally by their supervisor and officially via a letter of invitation from the Course Co-coordinator

9.3 Demographic information

The Research Project accounted for 12.5% of credit points of the final year of the Bachelor of Teaching or Bachelor of Education program and was expected to be undertaken in the student's internship school. Students designed their own school-based project in conjunction with their academic advisor/supervisor and their supervising teacher(s) at the school.

The 169 respondents represented 49% of the students enrolled in the course. The students were from nine different specialisations in the Education Faculty. The programs included the Bachelor of Education and Bachelor of Teaching double degrees in the areas of Design & Technology, Early Childhood Studies, Art, Fine Art, Health & Physical Education, Music, Science, and Social Science. When the distribution of responses was compared to the pattern of specialisations for the year the match was close to identical. The largest groups of respondents were from the Bachelor of Teaching/Bachelor of Arts (50%); Bachelor of Teaching/Bachelor of Health and Physical Education (18%); and Bachelor of Teaching/Bachelor of Early Childhood Studies (14%) programs. The respondents in each program were generally representative of the fourth-year cohort in that year. The majority of respondents were female (77%) and were aged between 21 and 24 years (79%).

The questionnaires were distributed to fourth-year students in the 'Professional Preparation' lecture in their second semester of study in 2005. At that time most students had completed their research proposal and ethics submission, and were commencing the data collection at their internship school. The lecture provided the only opportunity to access all students once they had commenced their internship. There was no parallel opportunity at the completion of the program because dispersion of students was rapid, and lecturers were under pressure to complete all program elements, none of which involved mass lectures. The survey was completed on a voluntary basis, responses were anonymous and no names were collected. The primary intent was to collect data that captured early phase preparation (literature review, question identification, proposal development, project negotiation), and to obtain a perspective on the positive or negative orientation to the different elements of the process. To achieve the latter a 'journey' plot that accommodated projection into the future was incorporated as the final section of the questionnaire. This was completed by 34% of the students who responded to the questionnaire.

The questionnaire asked for demographic information, as reported in Chapter Three, about the respondent, information about the structure of their program, and details about the research project. It contained items grouped in the areas: learning motivation, research efficacy, research environment and research orientation.

9.4 How motivated were students about research?

Access to the Research Project course cohort provides a valuable opportunity to explore how students reacted to the demands made of them to become independent professional learners in a research and training context. But how motivated were they?

Three areas of motivation were explored in this study – Intrinsic Value, Self-regulation and Cognitive Strategy Use. The scale descriptors and characteristics are shown in Table 52.

Table 52: ***Learning Motivation*** **scale characteristics (n = 152)**

Scale	Number of items	Mean	(SD)
Intrinsic Value	4	4.67	(0.7)
Self Regulation	5	4.28	(0.7)
Cognitive Strategy Use	4	4.49	(0.6)

Students were motivated to complete their Research Project, with all means falling between tend to agree and agree. The agreement was strongest for Intrinsic Value (4.67). Their perceptions of their self regulation and cognitive strategy use were also positive, suggesting that at this stage in the course they were, as a group, determined to see it through and they felt they could meet the intellectual challenges.

9.5 How confident were students in carrying out research tasks?

The four scales developed for use in this section were: Conceptualisation; Implementation; Early Tasks; and Presenting the Results.

Table 53: *Research Self Efficacy* scale characteristics (n = 147)

Scale	Number of items	Mean	(SD)
Conceptualisation	5	4.17	(0.6)
Implementation	5	4.10	(0.8)
Early Tasks	5	3.98	(0.8)
Presenting the Results	5	3.98	(0.8)

It is evident in Table 53, as it was in Table 52, that the results are positive overall. Most respondents indicated they were more confident with conceptual tasks such as brainstorming ideas for the literature (4.17) and implementation tasks (4.10) such as generating researchable questions. In many cases these were the tasks which had been completed by students at the time of completing the questionnaire. Students tended to be slightly less confident with tasks such as choosing the appropriate data analysis techniques (3.98) and presenting results such as interpreting and understanding statistical printouts (3.98). This may be because they anticipated these tasks would be harder than the ones they had already completed. The type of research training received may also have had a bearing on student's confidence in completing particular tasks, as the lecture sessions covered only the early stages of the project leaving the students to conduct their own reading and perhaps to seek the assistance of their supervisor for the later stages such as analysing and presenting results.

It has been shown above that students felt that, by and large, they were prepared for the course. However, were they ready for the essentially independent research experience of setting up their own project and did they feel well-supported?

9.6 Did the Research Environment support the students?

Research Environment includes two areas developed from the literature on the experience of undergraduate student researchers: learning community and research support

Table 54: *Research Environment* scale characteristics (n = 152)

Scale	Number of items	Mean	(SD)
Research Support	5	4.19	(0.7)
Learning Community	6	3.63	(0.8)

Respondents tended to be positive towards the statements forming the Research Support Scale as shown in Table 54. They felt that they had a positive research environment, in terms access to resources, services and networks on campus.

The Learning Community comprised the individuals or groups supporting the students. It embraced academics, professionals and other students. However, as can be seen from Table 54, on average the respondents tended to be neutral with respect to statements forming the Learning Community Scale. They did not feel attached to the staff or university community, to student associations, nor did they want to explore academic interests, or access the academics in the School to share ideas. These findings align with those of Robertson and Blacker (2006) who found that students may not feel a connection to academic community but, unlike the students they studied, this group was being directly encouraged to think of themselves as part of a broader research and learning community

9.6.1 Supervision

Supervision is an important part of an undergraduate research student's experience (Anderson, 2002; Fitzsimmons et al, 2003). Supervision of the Research Project was mainly through an individual supervisor for each student (96%). There was generally an equal mix of gender of supervisors, with slightly more males (53%). Most supervisors had a large number of students to mentor. Most students felt that they had some or a lot of involvement in the choice of project topic (90%) and perceived that their supervisor had little or no (48%), or some (26%), specific 'expertise' in their topic. Respondents indicated that meetings with their supervisor occurred infrequently (less than monthly) and in many cases rarely or not at all (83%).

Those students who did experience connection with the learning community met more frequently with their supervisor, and were more likely to be involved in a research group as shown in Table 55. However, the correlation coefficients, when significant, were low to moderate rather than high.

Table 55: Significant correlations with *Frequency of meeting supervisor/s* and *Membership of a research group*

Scale/Item	Frequency of meeting supervisor/s	Member of a research group
Learning Community scale	0.21*	0.22*
Research Support scale	NS	0.17*
Intention to Continue to Postgraduate study item	0.17*	NS

*Correlations significant at the 0.05 level

Those who met more often with their supervisor were more likely to feel they were members of a learning community and to intend to continue on to postgraduate study. Those who were members of a research group were more likely to feel they were members of a learning community and were more positive about the support being given by their university for their research. Anderson (2002) and more recently Fitzsimmons et al. (2003) found that the small group approach to supervision of undergraduate education students at The University of Wollongong provided high levels of support and alleviated feelings of isolation, which supports the findings in this study.

The experience of an undergraduate research project may be enhanced by developing research groups with key supervisors, and setting up regular meetings with the group. It is suggested that this would be likely to have a positive effect on the sense of belonging to the academic learning community.

9.6.2 Contact with the profession

The professional community is made up of student's peers and members of the profession, in this case teachers in schools. It is anticipated that pre-service teachers should be developing a sense of connectedness to their professional community, developing relationships with teachers through practicum experiences in schools. In addition they are developing working relationships with their peers through undergraduate group work which is also emphasized throughout their degree. These peers will continue on to be professional colleagues as they continue into the teaching workforce. Results indicate that those students who already had sustained contact with their profession within a school environment whilst developing their project had more confidence in completing research tasks in the implementation phase, and felt more a part of the learning community (see Table 56).

Table 56: Significant correlations with *Contact with Profession* and *Intention to undertake postgraduate research*

Scales	Contact with Profession	Intention to undertake postgraduate research
Learning Community	0.19*	0.21*
Conceptualising Research Project	NS	0.24**
Early Tasks	0 .16*	0.24**
Implementation of Research Tasks	0 .19*	0.20*
Presenting Results	NS	0.26**

* Correlations significant at the 0.05 level. ** Correlations significant at the 0.01 level (2-tailed)

The collection of data at a student's internship school is encouraged to make the Research Project more meaningful and applicable to the practice of teaching. In this sense, in the pre-service training research project is more explicitly linked with the professional community of teachers rather than the academic community particularly in the Implementation phase of the project. Nonetheless, there is some indication that a positive professional connection relates to a stronger academic connection.

9.7 Intention to Continue With Postgraduate Studies

Of the 169 students surveyed, most reported that they did not anticipate that they would go on to postgraduate research. Five per cent indicated that ‘yes’ they did intend to continue. A further 30% reported they were unsure. For this quite large group of students a positive experience in their Research Project might ‘tip the balance’ in favour of some of them eventually proceeding to undertake postgraduate research.

Reference to the final column of Table 56 indicates that feeling more connected to the learning community and confidence in undertaking research tasks were related to intention to undertake postgraduate studies. Recalling that it was also the case that students who met more often with their supervisor were more likely to want to continue through to postgraduate study (r = 0.17 shown in Table 55), the links between supervision, confidence and intentions for research demonstrates the importance of the supervisor in the process of research, even a minor research project in a professional field.

The intention to continue on to postgraduate studies was also positively linked with students being more confident in carrying out research tasks identified in the Research Self Efficacy scales. These correlation coefficients tended to be higher than other relationships found, ranging from 0.20 for Implementation of research tasks to 0.26 for Presenting Results. While it seems likely that those students who are more confident in carrying out research tasks are more likely to have an intention to carry on to higher degree research, only a very small percentage of these students are planning to do so at this point. This suggests a greater emphasis on research career paths, scholarships and a program to identify those who are capable of continuing could be fruitful.

The group of pre-service teachers who were unsure about continuing postgraduate study (30%) were of particular interest. Members of this group are still open to the notion of continuing their study, and at the very least are teachers who may continue research in the professional context with some support or encouragement. Can we identify any factors which would influence their decision as to whether they will continue on to further study? By comparing the means of the ‘yes’, unsure’ and ‘no’ groups, it was found that for three of the Research Self Efficacy scales the mean of the ‘unsure’ group was significantly closer to the ‘no’ group than to the small ‘yes’ group. This indicates that pre-service teacher confidence in their ability to carry out the tasks involved in research, in particular during the conception, implementation and presenting results stages, is related to whether they intend to continue. By increasing their confidence in carrying out research tasks particularly at the beginning of their research project, perhaps we can directly influence their intention to continue to research in the future.

9.8 Research Preparedness

It is clear from the findings for this group that the majority of Education students do not have a strong intention to continue on to further study. However, those with a higher degree of confidence with research tasks were more likely to have the intention to continue. Thus it was important to examine the preparedness for research at a higher level for this group, and in particular to determine if there were any factors which made a significant difference in how prepared a student was for research. The Research Preparedness Score (RPS) devised for this study comprised the motivation, research self efficacy and research environment scales. It also combined the student intention to continue on to further research studies, the type of start students had to their undergraduate research journey and the quality of relationships formed with academic staff. The analysis and reliability of the scale is reported in Chapter Six along with the analysis of the twelve factors which contribute to the score.

Education students had the lowest overall RPS with a mean of 15.07 (range from 6 to 20) compared to respondents in the other Honours programs. The Education students with the highest research preparedness were those from the Bachelor of Education degree, as shown in Table 57, indicating that these students were the most prepared in the Education cohort to continue with higher research. Students with the lowest research preparedness were from the double degree of Bachelor of Teaching/Bachelor of Arts, predominantly training to be primary teachers. This indicates an area in pre-service teacher training which needs attention given that students need to be encouraged to develop a love of research and research-related careers early in their schooling (House of Representatives, 2008).

Table 57: Research Preparedness Score characteristics-Education

Degree	Number of respondents	RPS Mean (SD)
B Teach/B Arts	72	14.72 (2.1)
B Teach / B PDHPE	28	15.45 (1.7)
B Teach / B Early Child	21	15.05 (1.6)
B Teach / B Science	4	16.26 (1.1)
B Teach General	21	15.07 (1.6)
B Education	7	16.53 (1.5)
Overall group	**153**	**15.07 (1.9)**

There were a number of program details identified with this group that made a significant difference to a student's research preparedness (see Table 58). Students who perceived that they belonged to a research group or had more contact with members of the profession were more likely to exhibit research preparedness, confirming that the learning community is important in providing support to students completing Teacher Research Projects. The other significant factor was training in research methods, which is understandable given the sketchy research training given due to a crammed fourth year of study.

As discussed earlier, the research project had previously been 25% of the final year load, however, had recently been reduced to 12.5% the result being that students were not given adequate training in research methods. The other aspect of the program which affected student research preparedness was supervision. As discussed earlier, supervisors were allocated large numbers of students to supervise and students were encouraged to see them as required. Given that students did not spend much time on-campus owing to their 10-week internship placement, it was difficult for them to establish regular contact with their supervisor. Those students who were able to see their supervisor more frequently felt more prepared for research (again see Table 58).

Table 58: Comparison of Means: Program Details and RPS

Program Details		**RPS**		
		Mean	**Standard Deviation**	**T-Test and probability**
Contact with Supervisor	High level	16.11	(1.6)	t=3.08, p=0.003
	Low level	14.81	(1.9)	
Training in Research Methods	Training	15.77	(1.8)	t=3.61, p=0.000
	No Training	14.65	(1.8)	
Contact with Profession	Contact	15.24	(2.0)	t=2.34, p=0.021
	No Contact	14.38	(1.6)	
Research Involves Group	Research Group	15.77	(1.5)	t=2.62, p=0.010
	No Research Group	14.83	(2.0)	

Although the students completing fourth-year Teacher Research Projects felt less ready for research than their other fourth-year counterparts, there were several contributing factors associated with the design of the program. The lack of research training and opportunity to connect with members of the learning community had a negative effect on their overall experience. This research experience from the student perspective is more closely examined in the next section.

9.9 The Research Journey

In the case of this group, the students were, at most, only half way through the journey, therefore completion of the plot calls on them to project into the future. This gives some indication of what tasks they think they yet have to complete. The plot captures positive and negative orientation to the process, in part retrospectively, in part prospectively.

Of the 169 respondents, 34% completed this last item on the questionnaire. It may have been that the survey was too long, but response rates were higher in other disciplines surveyed for the larger study. Students in the early stages of a busy and challenging period of time, with many new experiences and information to digest may have been too overwhelmed to try to envisage the project to the end of semester. This may suggest a sub-group with particular characteristics elected to complete this section of the questionnaire. The different shapes of the plots that were recorded, however, suggest that those who did complete a journey plot did differ in their dispositions towards the research project.

9.9.1 A typical journey in Education - Kelly

The research journey illustrated in Figure 38 was a female student studying full time in her fourth year of a Bachelor of Education (Science) degree. She was an Australian student aged between 25 and 34 years of age. She was unsure about whether she will undertake a postgraduate research degree in the future.

She had a male supervisor and was unsure as to whether he had any expertise in her topic of research. She met with him when required and had access to a computer laboratory for her research. She had freedom in her choice of topic. Her main project methods were: quantitative, statistical and document analysis.

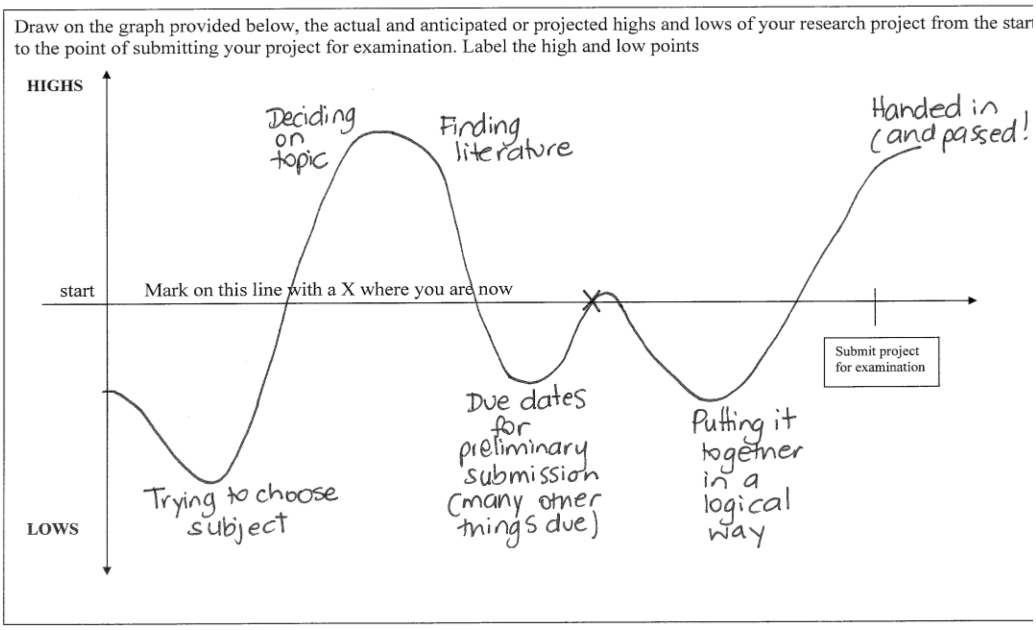

Figure 38: A typical Education Journey Plot (Kelly)

The research journey began, pessimistically, in the negative disposition range which became even more negative when it came to choosing a topic. In the open-ended section of the questionnaire this student commented that choosing the topic for her research project was difficult and there was little guidance about which direction to go in. When she did choose her topic, she was asked by her supervisor why she made that choice. When she said it was because she was interested and curious, her supervisor laughed and said that she 'was a rarity – most research is done on the amount of literature available'. Her journey continued to a high point when she decided on a topic and found literature for her project. It then dropped to a low when the student had a due date for submission, also indicating that she had other assignments due as well. This illustrates the level of coursework that is expected of the students in fourth year in addition to completing their Research Project and internship.

In terms of predicting the journey, the student did not identify any tasks that would be required. This is reflected in her Research Self Efficacy Measure where she was only a little confident about Conceptualising (4.0), Early Tasks (4.0) and Presenting Results (4.0) and was not very confident about Implementing (3.0) the research tasks. In particular, even though she identified the literature as a high on her journey plot, she was not confident about generating researchable questions and with tasks related to the literature review. She did predict, however, that she will end on a high point by passing her Research Project when it has been handed in. The fact that data collection, analysis and writing up were essentially collapsed into one component (essentially negative) may suggest that she had not identified the need for a clear plan of attack, or may indeed not have had any particular plan or understanding of how a project is operationalised.

In general, the journey plot shows how the students see their progress to date and what they anticipate for the remainder of their research journey. While the plot is used as a qualitative measure to provide richness and context to the quantitative data obtained through the questionnaire the information is also quantifiable. Some elements of this are presented below.

If the focus is start and finish points it transpires there are nine main types of Journey Plots (see Table 59). Only 7% of students who completed the Research Journey Plot started the journey with a positive disposition. Most students started their journey with a neutral (47%) or a negative (46%) disposition.

Table 59: Research Journey - Summary of plot positions at start and finish

Type of Plot	Frequency	Percent
Neutral start, Positive finish	16	25
Neutral start, Neutral finish	12	19
Neutral start, Negative finish	2	3
Negative start, Positive finish	19	30
Negative start, Neutral finish	3	5
Negative start, Negative finish	7	11
Positive start, Positive finish	3	5
Positive start, Neutral finish	1	2
Positive start, Negative finish	0	0
Total	**63**	**100**

In relative terms, those who had a more positive start to the research journey were more likely to be confident in 'Conceptualising their research project' and

‘Implementing the research tasks’ for their project (see Table 60), including specific tasks such as generating researchable questions, brainstorming ideas in the literature and following ethical principles of research. They also experienced a positive research environment, including access to adequate library resources, databases and access to study areas.

Table 60: Significant correlation with a *Positive Start to the Research Journey*

Scales	Start to Research Journey
Conceptualising Research Project	0.29*
Implementation of Research Tasks	0.30*
Research Support	0.29*

* Correlations significant at the 0.05 level (2-tailed)

Providing students with a high level of research support is one way that a Faculty can create the best positive start for students beginning their research project. Those who had a perception that they were provided with a high level of support and were confident about the early research tasks involved in their project showed a positive visual representation of their journey.

By determining the mean height and number of peaks (positive and negative) it is possible to visualize the average journey (see Figure 39). On average Education students start with a poor disposition (Time 10), move to a lower position (Time 20), then to high and low alternately (Times 30-70) and finish on a very high note (Time 80). There is almost a complete balance of positive and negative points, tending towards the positive.

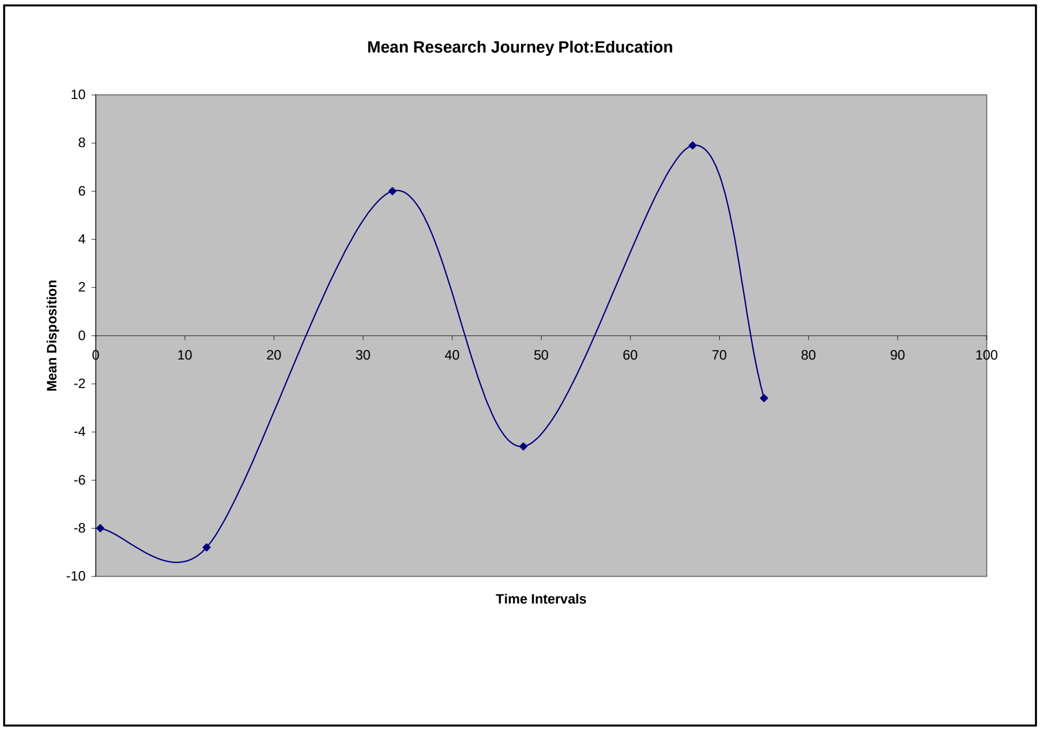

Figure 39: Mean Research Journey Plot: Education

In terms of the research tasks, selection of the research topic was the main area of concern, comprising 50% of all comments for the first peak, with 70% being negative. Comments included 'choosing a topic' (Education Student 136) and 'trouble coming up with a research topic' (Education Student 58). Given that the majority of students felt the strain of developing their topic, this is not a surprising finding. However, more introductory training could be directed towards developing the topic, or there could be more direct influence by supervisors on limiting the choices of topic. Of the comments for Time 2, 20% constituted a 'personal reaction' to or realization about doing the project, and 85% of these were negative. Comments included: 'realise how much of a hassle Research Project will be' (Education Student 28) and 'didn't want to do it' (Education Student 42). Clearly the conceptualization of the research project is a problem phase for which supervisors can prepare.

9.10 *'Fragility'*

In the introduction to the chapter questions were raised as to the fragility of the connection between early exposure to research activity and interest in research. In particular, the aims of a teacher research project are to build within professional practice the inclination to draw upon research findings when making educational decisions. It goes without saying that it is important to provide positive experiences of research.

Comments made by respondents in the open-ended section of the questionnaire illustrate the fragility of the connection. They were asked to contribute any additional information about their experience of fourth year, their research project or whether they would continue with postgraduate research studies in the future. Some 25% responded. The responses were grouped into three main categories: the fourth-year program (50%); the research project (40%); and the intention to continue on to postgraduate research (10%). Most comments made were negative (90%) and mainly in relation to fourth year and the research project.

There was an overwhelming concern by respondents about heavy workload in fourth year. They comprised 85% of the negative comments made about the fourth-year program.

Some comments were reflective or advisory:

> *At a time when our confidence should be being built up to prepare us for going out into the teaching profession, many students have their confidence demoralised due to unreasonable workload commitments and only ever negative feedback and comment. (Education student 77)*

> *The amount of pressure we have had this year was so ridiculous that I'm almost dreading being given a job. I feel overwhelmed. (Education student 86)*

A few suggested extreme disaffection:

> *For three years we cruise along with mediocre subjects, then we're hit with an overload of work. I am close to a breakdown. (Education student - n113)*

> *Fourth year has been a nightmare, has made me hate being here and I can't wait to finish even more. Our workload has been unrealistic, I think, in terms of producing quality work. (Education student - n154)*

Other comments in relation to the fourth-year program related to: support; consistency; and self doubt.

All of the comments made about the research project were negative in tone and sought more input.

> ***Lack of support***
> *We're not given enough help; they assume we know what we're doing. (Education student - n39)*

> *Initial support was poor and I felt lost and unable to find my way. (Education student - n53)*

> *The Research Project advisors need to get together. One advisor should not contradict another as in my case. This makes it TERRIBLY hard. (Education student - n80)*

> ***Lack of training***

> *Very little/ no direction in regards to Research Project. Told to buy the textbook and that's it. (Education student - n55)*

Need more direct/explicit teaching of research methods and procedures. (Education student - n114)

Relevance & time pressures

We have enough work on without worrying about a meaningless Research Project – the only reason I will finish it is to get a degree. I will never use it again. (Education student - n107)

The research project should not be invading our time on internship. (Education student - n131)

The comments of the 25% who responded provide some insight into the intensity of the experience. There were no significant correlations between those who made comments and other elements of the questionnaire aspects. Even if we assume that those who did not comment were positive, there is reason to be concerned that the workload (including the pressure of a research project) gives rise to such a negative view of the experience by a sizeable group. There can be no doubt, given the evidence presented, that the research project requirements in a busy and pressured year led to a significant level of concern and anger.

9.11 Summary

The data presented explored predisposition to research and the level of preparedness to undertake a research project. The students who met most frequently with their supervisor and showed higher research self efficacy were also most likely to want to undertake postgraduate study and reacted positively to good personal support and a feeling of belonging to a research 'community'. Many felt they were 'unconnected' to a learning community, and specifically to their supervisor. This was not surprising given the large number of students each supervisor was expected to mentor, rather than utilising a small group or one-to-one model of supervision.

Students were generally positive about their ability to do the tasks, such as finding and writing up literature, even though they were concerned about managing the overall commitment. Despite this they were optimistic about completion. Only 5% were sure they would undertake postgraduate study in the future, and 65% were sure they would not do so. As a group, Education students felt least prepared to continue on to further study, although a large proportion of the other Embedded respondents were also unsure. However, there were indications about how to improve their preparedness such as more frequent meetings with supervisors, involvement in a research group and increased training in research methods. Also, contact with the profession correlated with a higher research preparedness score, indicating that contact with the internship school in relation to the research project was positive.

In a professional educational environment where there is commitment to promoting research skills consistent with the needs of a knowledge society and drawing on evidence to inform practice, the findings not only raise the question of how best to support and give meaning to early research endeavours of pre-service teachers, but also highlights the challenge of achieving this against a high level of disinterest in further tertiary study. It is vital that teachers have an understanding of the value of research, particularly given the recent findings from the House of Representatives (2008) that the committee had ‘overwhelming evidence testifying that primary and secondary years are a ‘critical window’ for developing a love of learning, an interest in research and an awareness of career opportunities with research.’ (p.6)

In the next chapter, the overall results from the data chapters are discussed and the study concludes with the main findings. Areas for further research in this emergent field of research will be identified.

10. CONCLUSIONS AND DISCUSSION

10.1 Introduction

This study was prompted by the lack of empirical studies on student experience of fourth-year undergraduate research projects which remain largely invisible in the global higher education landscape. Australia is unique in terms of research preparation for its students, providing a substantive research project in fourth-year undergraduate programs in order either to prepare students to continue to higher degree research or to produce research-ready professionals for the workforce. In light of recent policy changes to higher education worldwide, prompted by the Bologna agreement in Europe and the need to have internationally competitive doctoral programs (Park, 2007), it was timely to reflect on the position of Honours programs within the Australian undergraduate curriculum which are positioned between teaching and research in Australia's 36 publically-funded universities. To inform academic knowledge on Honours it was furthermore vital to consider the research experiences of students engaged in these undergraduate programs.

The early research experience of students is of interest given the current issue of non-completion and high attrition in doctoral studies. Additionally, the increasing gap between the number of students continuing on to a career in academe and replacement numbers required is of concern given the aging academic population in Australian universities (Hugo, 2008; Bradley et al, 2008; House of Representatives, 2008). Although Honours awarded at the level of credit and above can facilitate direct access into a research higher degree in Australia, Honours degrees awarded at the First Class level have been the gold-standard for competitive scholarships (Kiley et al, 2009) and can 'fast-track' a successful student directly into a doctoral research program. Although Honours is used to identify which students are most likely to succeed in research higher degrees, there is not a lot known about the scope of Honours research programs offered in different fields, how they are structured or about the numbers of students who are enrolled in these degrees. Furthermore, it is unclear how many of these students then continue on to research higher degrees.

What is clear is that there are a diverse range of research experiences on offer in Australian undergraduate fourth-year programs, dependent on the disciplinary program being studied. Following changes to higher education in Australia at the end of the binary divide, including the introduction of professional degrees in universities and the massification of higher education over the past three decades, there have emerged an array of Honours programs shaped according to the disciplinary context, the needs of employers and the requirements of professional bodies. This is coupled with the rise of professional doctorates (Boud & Lee, 2009) and the growing interest in research degrees, as the numbers participating in doctoral research programs in Australian universities has grown to 42,366 in 2008 (DEEWR, 2008, Table 23), a substantial increase since 2000 when the number was 27,996 (Harman, 2003). Nevertheless, there is little empirical research about how the Honours year prepares students for research.

There is also a paucity of in-depth literature published about the student experience of undergraduate research across a range of disciplines. Studies which detail the research experience are from the perspective of the student and are primarily individual accounts of their journeys (Dorona-Ope, 2008; Holloway, 2005; Neill, 2005; Perera, 2005; Meng, 2004; Trotter, 2003). Moreover, most of these refer to the doctoral journey in social science-based disciplines. This study adds depth and scope to the literature, contributes comparative detail about the undergraduate research experience from the student perspective across disciplines and, in short, captures the rich and varied nature of the Honours landscape.

There are four sections in this chapter. In the first section findings from Chapters Four to Nine are discussed in light of the research questions for this study. The four main areas under investigation were: the description of fourth-year program types and structures within one institution, the characteristics of the fourth-year student cohort, the types of research journeys they experienced, and preparedness exhibited by students for future research. In the second section the author will describe the limitations of the study. Finally, the contributions and implications of the study are discussed in light of the findings and their impact on the field of education and the current directions in higher education are then argued.

10.2 Findings

The Honours degree in Australia is a well-established undergraduate pathway to higher research degrees in traditional disciplines. Less known is what research opportunities are offered in the newer disciplines and professional-based degree programs. Until very recently, few studies have traced the multiplicity of options offered to students within institutions and what they mean for student's experience of research. In this study, the pathways within one institution provided the framework for studying the student experience.

In the first phase of the study the range of fourth-year research programs in one institution were explored by scoping accessible information, such as course outlines and Honours handbooks, and by conducting interviews with 19 Coordinators of fourth-year research programs. The analysis of data addressed research questions about the structure of fourth-year programs, the reasons for offering undergraduate research opportunities; the key outcomes for the students and the recruitment methods used to tell students about Honours research programs. In the second phase of the study the student experience was investigated through a questionnaire administered to 295 fourth-year students. The questionnaire addressed the research questions about the student cohort involved in Honours programs. The specific questions included demographic and educational characteristics of the students in a range of fourth-year programs, such as personal characteristics, candidature details and program details. Also of interest was how students perceived their research environment, their motivation for research, their self efficacy towards research tasks at different stages of the project and their intention to continue on to further research studies. The third area of the study aimed to illuminate the experience of students through a journey plot which asked students to visualise their research experience and to identify the highs and lows of the journey. This then led to the final area of the study which explored the concept of research preparedness, coalescing the student's perceptions of their experience and how it prepared them for further research in university or within their profession. This section of the chapter draws together these findings.

10.2.1 Structure of the Fourth-year research programs

The first area of interest in this study was the structure and relevance of fourth-year programs. The range of opportunities for fourth-year students to undertake research was loosely structured into two main categories. The first type was End-on Honours as an add-on year students could undertake after graduating with a high credit average from their undergraduate degree. The End-on Honours year focused on a research project, with any coursework complementing the research in terms of research training or extending disciplinary knowledge. The second type was Embedded Honours which was the final year of a four-year undergraduate degree where the research project was embedded in the fourth-year curriculum along with other coursework. In profession-based degrees the fourth year also included experience in an industry setting, such as a teaching internship or a clinical placement. These types of Honours mirrored those of a large scale project, based in Australian universities, whose findings have recently been published (Kiley et al, 2009).

At the time of data collection, there were varied research-to-coursework ratios in the fourth year, dependent on the discipline and the type of Honours. However, the interviews with key faculty members and document scoping in this study suggest that, in this university at least, there was a move to standardise the Honours experience. The new requirements specified a minimum ratio of student load a research thesis could comprise in relation to coursework (ratio of 3:5), which all fourth-year programs had to conform to when offering an Honours program. The university was in the midst of enforcing these requirements when the data for this study was collected.

There were varying levels of coursework involved in the range of fourth-year options. Predominantly, the End-on programs were focused on the thesis and building research skills and disciplinary knowledge, and the coursework offered complemented the research process. For example, in Science-based fourth-year programs the thesis tended to be the main focus of the course, with support in research training given by the supervisor and members of the research group within the laboratory. Whereas in some other traditional disciplines, such as Arts, compulsory subjects or workshops were provided addressing specific research training needs for the students involved. For Communications and Design there was an inter-disciplinary research methodology course for all Honours students within the School which exposed students to a range of different epistemological and methodological traditions.

Within the Embedded programs the research project formed a component of the fourth-year program, with the focus being on specialised electives and practical-based courses to prepare students for their profession or industry. For this group the coursework competed with the research project in terms of time and value. In particular, the research project in Education had been reduced to a very small proportion of 12.5% of the final year program and the Coordinator emphasised the competing interests in preparing pre-service teachers for the profession. The training in research methods had recently changed from lecture-style delivery to an on-line course.

10.2.2 Reasons for offering Honours

The reasons for offering students an opportunity to engage in research in their fourth year depended on the career opportunities for Honours graduates, and the research opportunities provided, in specific discipline areas. Academic ability, as demonstrated through results in a coursework program, was not always seen by Coordinators of fourth-year programs as a predictor for success in postgraduate research. As such it was important for students to experience a capstone research experience as a part of their undergraduate degree. The reasons for offering the research experience are shown in Table 61.

For the more traditional research disciplines, the research project was seen as an entry into the research arena. Opportunities were provided to experience research by doing a research project to gain confidence in the process of research. In some disciplines, such as Physics, students were able to present their work to academics, both within the department and outside the institution as a part of a viva and by presenting at conferences. For many students Honours was the first chance to focus on a specialised area of interest within the disciplinary context. For the professional-based programs, where there was often a high employment rate and high salaries for graduates, the research project provided an opportunity to conduct practice-based research. A number of the programs such as Design, Engineering and Speech Pathology provided opportunities for their students to network with prospective employers, particularly in the presentation phase of the research projects. For Education the research project provided an opportunity for students to engage in the research process within a practical setting of their internship school as a part of their professional development.

Table 61: Reasons for Offering Undergraduate research projects and the key stakeholders in the process

Reasons	Key Stakeholders
Uncovering research potential	Students, Staff with Grant
Opportunity to be involved in research	Students
Bridge to a PhD	Students, Academic Staff
Opportunity to conduct practice-based research	Students, Prospective employers
Part of Research Grant/Scholarship	Students, Academic staff
Accreditation	Students, Professional body

Overall Honours was regarded as a way that academic staff could identify a hidden potential or capacity for research in students within their discipline.

Programs with a strong tradition of grants-based research, such as Science and Engineering, were able to involve students in a larger project and to provide scholarships for students to complete Honours. In some disciplines there was a competitive environment, where academic staff vied to attract the 'best' students to their specialty, with the view of training potential colleagues and research partners in the field. These students were vital for the successful outcome of the grant, had the capacity to publish their work as a part of the research team and would often continue to research in that area as they progressed to research higher degrees. These disciplines had an additional reason for offering a research project in terms of accreditation. Professional-based accreditation bodies monitor the requirements of the research project to ensure comparability to other national programs. In one case, the fourth-year program was accredited on an international level, giving graduates increased mobility options across Europe.

In most disciplines, particularly in the more traditional discipline areas, where Honours is awarded predominantly on the basis of examination of the research project, the undergraduate research experience was viewed as a bridge to the PhD. In the professional programs, those awarded First Class Honours based on their overall academic performance are also able to proceed directly to a PhD program, however, very few students do so. The disparity in the awarding of levels of Honours degrees has contributed to concerns that the pool of postgraduate research applicants is limited by out-of-date and inconsistent standards. This needs to be addressed in light of the pressing need to increase Australia's research force. (House of Representatives, 2008, p.93)

10.2.3 Key outcomes for students

The role of Honours programs was explored in depth in relation to the key outcomes of the program for the students and also what made a 'good' researcher in that discipline. Coordinators interviewed in this study perceived that there were five main outcomes for students involved in fourth-year research programs: a stronger grounding in the discipline, the development of research skills and skills transferable to the workplace, confidence in conducting the research and resilience when met with challenges.

A stronger grounding in the discipline was identified, partly because of the more intensive nature of the relationship with staff, but also because students were able to apply the knowledge and skills they had learnt in the discipline to real-life situations. Students were encouraged to 'think outside the box' and to be more creative in their thinking. It was perceived by Coordinators that they also learned other skills which were transferable to the workplace such as time management, project management, communication and networking. In some cases students were required to undertake courses or seminars to continue to develop their knowledge of the discipline, which the coordinators reported had diverse responses from students. Some students resented the requirement to participate in activities which were not directly linked to their specific research area. Although others found that they learnt more about their discipline and could then relate these understandings to their topic. The provision of a support network for students, in the form of peers, postgraduate students, academic staff and experts in the area, was also viewed as a key aspect of developing grounding in the discipline.

Students were also developing their research skills, particularly as part of the inquiry process as described by Willison & O'Regan (2007), such as designing the project, responding to a specific problem, collecting and analysing data and writing the thesis. Through engaging in the process of research students gained confidence in completing these research tasks and their personal growth, as described by one coordinator, could be 'exponential'. Some students grappled with the intellectual challenges of the program, particularly mastery of the literature, but those who demonstrated resilience when facing the struggles in research showed that they had what it takes to continue on to further study.

Coordinators used imagery to describe a capacity for research during the project – 'adapting like a fish to water', 'blossoming' and 'a bit of extra spark' were some of the descriptions used to capture a student's potential to continue on to further research studies. This outcome of Honours, while intangible, seemed to be an immensely valuable part of the process for the Coordinators. A desire in a student to create new knowing, or a curiosity to discover new things, signaled to academic staff a potential talent which if nurtured could be the future of their discipline. This finding mirrored the ‘curiosity’ explained by Lovitts (2008) in her study on focus group interviews with academic staff experienced in doctoral education.

There was a sense of value, and even passion, encapsulated as Coordinators described the transformation of these developing research students within their discipline. In this one site, it was clear that there was very specific training required to reach the fourth-year level of study in particular disciplinary areas. For example, in the illustrations that follow, both disciplines offered an End-on Honours program but showed very different development of skills for the students. Music required the sustained and focused practice of an instrument under the guidance of expert tutors in their fourth year. Design required immersion in their profession, with students undertaking a fourth-year project required to engage in a ‘real-life’ design project involving liaison with clients in the field.

An Honours student in Music required a level of performance commensurate with the specific study of an instrument over an extended length of time. The positive outcome of the Honours experience described by the Coordinator for this Creative program was to devote the time to practice their instrument for a whole year, whilst accessing expert tutors. This was viewed as an opportunity for a student which would positively impact on their musical career particularly if they were seeking a performance career in the classical areas or in the area of composition. The Coordinator described a capable Honours student in Music as someone who was able to transcend their own performance style by becoming totally immersed in the work of a particular composer.

Design offered the opportunity to work intensively with a community organisation, applying the knowledge and skills they had learnt about design to a real-life context. This was seen by the Coordinator as imperative to their ‘Honours experience’, with their use of a specific body of literature to justify the application of techniques. The value of the Design program was enhanced through goodwill generated by Honours students devoting their time to a community cause, and the authenticity of the project meant that the work was utilised within the industry. The purpose of the program was not oriented towards a research or academic career, however, was still intensely valuable to the industry. Graduates were trained to enter the industry at a higher level and the program developed graduate attributes above that gained in a Bachelor degree program. It was perceived that the 'ordinary undergraduate' would not be capable of carrying out the same role in an organisation as a more capable 'Honours graduate'.

Although students in the study reported a similar overall research experience in terms of their research training (becoming confident in research tasks, experiencing motivation for the project, and interacting with their research environment) they were in reality experiencing research in entirely different contexts. In interviews with fourth-year coordinators, themes emerged from the data which pointed to disciplinary differences in the experiences of students engaged in science, professional and humanities-based research projects. The investigation of the key outcomes for students involved in fourth-year undergraduate research share similarities with studies undertaken in the area of doctoral research. Honours represented a certain level of achievement in a particular discipline, and in some of the newer Honours programs a melding of academe and elements of the profession was instrumental in increasing the specialist knowledge in their field and developing their professional identity.

10.2.4 Recruitment and identifying a propensity for scholarship

Given the current focus on increasing the numbers of students continuing to higher research degrees (Bradley et al, 2008), the recruitment strategies used to inform undergraduate students about the research opportunities available in the discipline were of interest. In this study, recruitment for Honours was found to be carried out on either a Faculty or School-based level. It has been suggested in other studies that a personal approach from academic staff within the discipline is the most effective method of recruitment in attracting research students (Kiley & Austin, 2000; Mullins, 2006). This was also a strong finding of this study, with students forming the strongest relationship with academic staff being the most likely to say they intended to undertake a research higher degree. Through the overall investigation of recruitment strategies it was clear that disciplines on the whole approached the prospective Honours students in a haphazard manner, with a mixture of formal, informal or collective approaches to identifying students with the potential for research. It is an area which can be examined further and formalised on an institutional level to recruit more students to continue on to Honours, therefore expanding the number of potential applicants continuing on to doctoral study.

A strongly identified link to increasing recruitment of undergraduate students was the academic staff members within the discipline. Personal invitation by an academic staff member was identified as one of the main reasons students continued to Honours programs. In-depth analysis of the interview data also suggested that Honours coordinators saw themselves as stewards of the discipline. A steward of the discipline has been defined as one who is entrusted with the care of the discipline on behalf of those in and beyond the discipline. Stewards are also caretakers who direct a critical eye towards the future. They must be willing to take risks and to move the discipline forward. Ultimately stewards consider how to prepare and initiate the next generation of leaders (Golde & Walker, 2006). The staff members interviewed in this study saw themselves in a position to identify a propensity for scholarship in undergraduate students, which manifested itself in different ways dependent on the disciplinary context. This was explored for five different disciplines in Chapter Five, with stories embodying how skills develop within different types of undergraduate research programs. The propensity for scholarship was not something which a student could identify in themselves – it was something innate which could be uncovered by ‘experts’ through the process of supervising a student doing research.

10.3 Student experience of research

The second area of interest in this study was the cohort of students in fourth-year. The specific research questions in this area of the study were based on personal characteristics; candidature details; and differences in program details. There were also factors explored in the study in relation to the student's perception of their experience, including: research environment; motivation; research self efficacy; and their intention to continue on to further research. The overall findings from each will be outlined in this section.

10.3.1 Personal characteristics

The participants in this study were mainly Australian students aged in their early 20s, with the majority continuing on from their third year of an undergraduate degree without a break in study. This is a group who have not been a previous focus of studies in terms of their early experience of research, but who are of interest due to the aging academic workforce and the significant under-representation of academics in their 20s and 30s in Australian universities (Hugo, 2008; Bradley et al, 2008). The majority of respondents in the study were full-time students, who supported themselves financially through part-time work or government study assistance.

10.3.2 Candidature and program details

The majority of respondents were from Education and Engineering, which had larger number of students in their courses on the fourth-year research project to draw on. Other respondents were from the Sciences and Arts. Overall there was a representation of respondents from eight disciplines in the study, within these broad fields. Although the majority of respondents are female (61%), the sample shows imbalance with respect to gender and discipline. Education and Arts both have high proportions of female students, and Engineering has a very high proportion of male students. A high proportion of the students in this study had continued without a break in their study, and a slight majority did not intend to continue on to research higher degrees.

Predominantly the candidate data was collected at the end of the fourth-year research project. The questionnaires for Education were completed at a different time to the rest of the Honours groups, due to the difficulty in accessing the cohort at the end of their research project as they were on a teaching internship off-campus. This influenced the analysis and reporting of data, where the Education cohort is reported separately to the rest of the Embedded Honours group.

There were varying proportions of research included in the fourth-year Honours programs. Most of the End-on programs involved a full year research thesis making up 100 percent of the program, with workshops or seminars provided for students in research training and advanced theory required for the thesis. The Embedded programs had varying proportions of research included in their fourth year, from 12.5% of the load for Education students to the majority of programs for which research made up 37.5% of their load for the year.

Most respondents had considerable involvement in their choice of topic and predominantly they were not involved in a research group. The most frequent research methodology utilised in research design was Observation, followed by Qualitative and then Experimental. The type of method used was primarily based on discipline, with Observation most frequently nominated by Education respondents and Experimental and Laboratory-based methods nominated by Engineering and Science students.

10.3.3 Research Environment

During the fourth-year research project most respondents had contact with their industry or profession and had a high level of contact with their supervisor, particularly the respondents in science-based programs. Most respondents had one supervisor during their project and well over half the total supervisors were male. Students on the whole related most positively towards their peers during the project, although they also found academic and administrative staff helpful. They felt they had a positive research environment in terms of access to resources, services and networks on campus.

As reflected in the literature, the research process could often be an isolating experience, with the level of integration and connection with the program factors in determining whether students would be likely to complete their study (Lovitts, 2001). The results from this study confirmed that the learning community was an important aspect of the students experiencing an undergraduate research project.

10.3.4 Motivation

Motivation in this study was based on a social-cognitive view of learning styles, with the student having an active role in the learning process and being in control of how they approached their research project. This general model of motivation and learning proposed that personal characteristics such as age shaped how an individual approached an achievement task. The students who participated in Honours projects on the whole were those who had achieved above a Credit Point Average in their previous studies, excepting those in the Education cohort where the research project was compulsory for all fourth-year students. Success and failure could influence the level of engagement and motivation within a course.

The areas used to explore motivation in fourth-year research students were Intrinsic Value, Self Regulation and Cognitive Strategy use. Of the three scales, the one with the most variance was Self Regulation. This indicated some students found it difficult in their research projects to keep focused on the task at hand and to continue when the task was uninteresting. In particular, the Education students generally had a lower mean response to this scale, although overall it still tended to be positive.

Overall, participants in this study perceived themselves as motivated to complete a research project. The students involved in an End-on Honours program were the most motivated. A likely explanation is that they chose to continue on to the one-year degree after completing their three-year Bachelor qualification.

10.3.5 Research Self Efficacy

Self-efficacy beliefs help to determine how much effort students will expend on an activity, how long they will persevere when confronted with obstacles and how resilient they will be in the face of adverse situations. People with a higher self efficacy sustain their efforts in the face of failure and recover more quickly after failures or set-backs as they attribute the failure to knowledge or skills which are acquirable. The Research Self Efficacy scale was based on the work of Bandura (1986), who identified a missing element in social-cognitive theory which he called self-belief. The measure used for this aspect of the study was based on research self efficacy in the area of vocational theory. Measures were adapted from existing studies so they were applicable to students completing an undergraduate research project in the Australian context. Four scales were developed from the items based on the tasks undertaken during the research project: Conceptual; Early Tasks; Implementation; and Presenting Results. Although these are common terms they constitute different meanings depending on the discipline. At different points of the journey the nature of the tasks does change from the early to late stages. They are sequential phases which build on the one before, regardless of the nature of the Honours program.

Overall, students who completed the questionnaire were confident in all phases of the research process as reflected in the Research Self Efficacy scales. Generally those students involved in laboratory-based research were more confident than their non-laboratory counterparts. In terms of the different types of research programs, students in Education were less confident with the Implementation and Presenting Results phases. However, they were surveyed before going out to conduct their practice-based research in their internship school. This may indicate that for this group of respondents at least, as Winn (1995) suggested, confidence may be gained through the process of doing the tasks.

10.3.6 Intention to continue to postgraduate research

Respondents were asked as a part of the questionnaire to indicate their intention to continue on to further research studies. Only a small proportion of respondents indicated that they intended to continue on (14%), with over half of the respondents indicating that they did not intend to continue on to further research. There were a third of students across a range of programs that had not yet made up their mind whether they would continue. This was an area of interest in this study, particularly as many universities are trying to increase the number of undergraduate students continuing on to research higher degrees. In terms of students who undertook an Honours program the majority of respondents indicated two main factors which they felt contributed to their decision: a personal invitation from an academic staff member and the desire to continue on to a research higher degree. Almost a third of students who responded indicated that they chose to continue on to Honours because they felt they were not yet ready to leave university and enter the workforce.

In this study, the students from laboratory-based programs were found to be more likely to intend to continue to postgraduate study than their non-laboratory counterparts. Respondents were more confident about completing all stages of the research project than their non-laboratory counterparts and positive about the research environment and support given by the university. They were intrinsically motivated and had frequent contact with their supervisor, who they predominantly viewed as having a lot of expertise in their area of study. They also viewed the learning community positively, indicating that for these students the research environment was enhanced by the collaborative environment, a finding also reported by Waite & Davis (2006).

Students enrolled in an End-on Honours program were also more likely to intend to continue to undertake postgraduate research. This may be because these more traditional forms of academic programs have a clearer pathway to doctoral study, and in particular those who do well and graduate with Class I Honours are likely to receive a scholarship to continue their studies. For Education students, for which the research project was compulsory, on the whole the intention for students to continue on to postgraduate research was low. This was also accompanied by dissatisfaction with the research experience which emerged as 'fragility' in their outlook. As most of the students were training to be practitioners in their field this outcome is not surprising, however, of concern to research is that these students are taking with them this negative orientation about research to the workplace and the effects this outlook may have on their intentions to incorporate evidence-based practice into their teaching.

10.3.7 The Research Journey

The third main area of interest in this study was the student experience of undergraduate research projects. The lived experiences of fourth-year undergraduate students involved in research projects are relatively unexplored. Most studies tend to be single discipline and consequently there is little known about the experience of research from the perspective of the students themselves. This is also a relatively unexplored area in doctoral education, although there are some accounts of journeying to draw on in this field. A few students have written published personal accounts of the doctoral experience (Dorona-Ope, 2008; Meng, 2004; Trotter, 2003) and there is more recent exploration of the research process through blogging (Ward & West, 2008). Metaphor and imagery are used to try to elucidate the experience of the unknown to those who have not yet experienced it (Brause, 2000).

This study used a visual tool called the 'journey plot' in an attempt to capture the dimensions; extremes and pivotal points of journeys evoked in the autobiographical accounts, yet in a way amenable to direct comparison. The assumption here, based on both the literature and knowledge of research process, is that some features or phases of the journey would be comparable. Of the 295 respondents to the questionnaire, 55% completed the journey plot. Profiles of the undergraduate student experience in different disciplines were presented in Chapters 8, 9 and 10 in the form of individual student journeys, where the journey plot is linked with other scales from the questionnaire and the open-ended comments that the students made. It is clear from these profiles that each student had a unique experience of the research process; however, there are elements of the journey which can be compared across programs.

On a visual level a comparison can be made by focusing on the positive, neutral or negative dispositions at the start and finish points of the research journey. Using these points of comparison there were nine main types of Journey Plots. Only 19% of students who completed the Research Journey Plot started the journey with a positive disposition. Most students started their journey with a neutral (44%) or a negative (37%) disposition. No matter how the plot started, the most common finish of the plot was a positive (65%), demonstrating that overall students felt positively, or in the case of Education students where data was collected before the finish of their project, anticipated they will feel positively, about the project at its completion.

The journey plot as devised for this study enabled five points of comparison. These were the elements of: duration; complexity; events; intensity and impact. These elements are expanded on in detail in Chapter Six. The plots with the longest duration were from the science-based disciplines. This may be because for these respondents the experience of the project often continued after submission, particularly as these laboratory-based programs were more oriented towards the research team and in some cases were part of a larger research project or grant within their discipline. The plots with the shortest duration were from the Education respondents, indicative of the collection of data before the rest of the respondents due to students having a practice-based internship for their last term making contact with students at the university to collect data difficult. Complexity indicated how many high and low episodes were experienced by respondents during the journey. The respondent plots with a higher level of complexity were those in the science-based disciplines and also respondents from Communications and Design.

The labeling of the high and low episodes along the journey plot was open-ended, meaning that respondents self-identified their successes and challenges along the way. The labels on the high and low episodes were coded into two categories: task-related and personal events. The research-related tasks identified along the journey by respondents were comparable with the tasks identified in the Research Self Efficacy scales, organised into a sequence of phases: Conceptual; Early Tasks; Implementation; and Presenting Results. Another task-related category identified in addition to the research-related tasks was Coursework, which was coded as a discrete category of the journey for students. The personal events identified by respondents on their journey plot embodied emotional comments about research or the specific research tasks.

Intensity was a measure of the highest and lowest points of the journey, which when combined with the coded label gave an indication of strength of the relationship towards the event for a respondent. Of the respondents who provided a research journey plot, the majority finished with a positive disposition towards research. The most frequent event identified was completion, which may have contributed to the overall positive disposition students either projected or experienced at the end of the research project. Respondents had the strongest relationship with the task-related events and were on the whole most affirmative about conceptual tasks such as formulating the research questions and collection of data. Tasks which indicated the strongest negative relationship included the Research Proposal and Ethics.

The measure of Impact represented the amount of emphasis given to an event along the journey. The research question and data collection, in addition to showing a strong intensity, were also seen as events which had a positive overall impact on the journey. The tasks which had the most negative impact on the journey were the Research Topic, Research Proposal and Ethics. The other item which made a substantial impact on the overall journeys, in a negative sense, was

Coursework. This related to the fact that a majority of the respondents were from Embedded Honours programs and had competing demands on their time in terms of other coursework. The finding supports results from other studies (Todd et al, 2004) where students experienced difficulties with juggling competing demands. In terms of the personal aspects which impacted on the overall journeys there were positive and negative events identified. Overall motivation to complete the research project was positive, as was the overall impact of the Learning Community on the journey. The Feelings and Expectations associated with the student's research experience on the whole had a negative impact on their journeys.

10.3.8 Research preparedness

The final area of interest in this study was the exploration of the theoretical construct of 'research preparedness' proposed at the outset of the study. It was envisaged that a preparedness to continue on to further research studies was based on student's perceptions towards their learning motivation, research environment, research self efficacy and research orientation. In addition the perception of their experience in becoming a researcher formed the basis for this measure, based on insights raised in the literature about the student experience of undergraduate research.

A nascent measure of Research Preparedness was developed using components already reported in this section of the chapter: motivation; research self efficacy; research environment; intention; quality of relationship with academic staff; and positivity towards the research journey. Respondent scale scores were factor analysed to form an overall Research Preparedness Score (RPS) with satisfactory construct validity. A single-factor solution was then tested which supported the creation of a single scale. The Research Self Efficacy scales were the most important for research preparedness and the start point of the journey plot the least important, with the other measures between these two extremes.

The findings suggested that, as a whole, students who undertook a fourth-year research project generally exhibited research preparedness. Gender made a significant difference to a student’s perceived preparedness for research, with male students more likely to show evidence of research preparedness than their female counterparts. Indeed, despite high female participation rates in higher degrees by research, the proportion of women progressing to, and remaining in, a research career is low, especially in academia and the areas of science, technology, engineering and mathematics (House of Representatives, 2008, p.118). Also students undertaking End-on Honours programs were more likely to exhibit research preparedness than respondents from other types of fourth-year programs.

10.4 Specific findings to types of fourth-year research programs

As previously outlined undergraduate research experiences provided within this site can be categorised into three different types of fourth-year research programs: the ‘End-on’ Honours, the ‘Embedded’ Honours and a teacher research project. The range of experience for students within these types of programs is discussed in this section.

10.4.1 The ‘End-on Honours’ experience

Respondents in the study completing an End-on Honours program comprised 18% of respondents to the questionnaire. The disciplines were predominantly Science-based (74%) with the remainder from Arts-based disciplines. They were on the whole motivated to do Honours and confident about the research related tasks for all phases of the project. These students were self-selected and had a high engagement with the learning community, meeting more frequently with their supervisor than students from other types of fourth-year programs. Research groups were an important factor in their experience, with those involved in research groups more likely to be confident about implementing and presenting research, and to be self regulated learners. Those respondents who indicated they belonged to a ‘group of researchers’ studying in a similar area to them were also more likely to have the intention to continue on to postgraduate research study.

A key factor which contributed to student’s confidence in research tasks were the facilities which were provided by their discipline to enable them to carry out their research. Facilities provided included science laboratories, computer labs and equipment available such as data projectors and interactive whiteboards. These facilities became more important as the project progressed, with confidence in presenting results of the study being strongly related to the facilities provided to assist in the presentation of the project.

A high proportion of the students in End-on programs who participated in the study completed the Journey Plot (91%), which predominantly showed a positive orientation toward research. Events which impacted positively on the journeys of this group of students were Coursework and Literature-related tasks, with Completion of the project receiving the most intense response from students on the whole, perhaps with the feeling of jubilation that the project was at last complete! Although completing Ethics and Writing up the project were identified as lows, they had little impact on the journeys of the group as a whole. The areas of concern identified in the journey plots for the End-on Honours students were in the conceptual phase of the project, namely formulation of the Research questions and Topic, which had a negative impact on the journeys of the students as a whole.

Personal events were positive overall on the journey, with most categories identified as highs. The only area of concern of a negative nature which affected the journeys of respondents was Motivation, which was surprising considering the motivational scales were positive for this group. This indicates that although students responded positively to the items on the motivational scales, intrinsic motivation, self regulation of learning and cognitive strategy use, at the end of their project they nevertheless self-identified motivation towards the project as a negative event along their journey.

10.4.2 The 'Embedded Honours' experience

Students in the study completing an Embedded Honours program comprised 25% of the respondents to the questionnaire. They were predominantly from the Engineering and Built Environment disciplines, with the remainder from Speech Pathology. They were on the whole motivated to do Honours and confident about the research related tasks for all phases of the project. Although meeting frequently with their supervisor, their contact with the learning community was not as strong as for End-on Honours. Industry was an important factor in their experience, with the majority of those completing their research project having contact with their industry. Most students did not intend to continue on to postgraduate studies as there was a strong focus on the workforce. The comments made by a small number of students, however, indicated that the research skills learned would be a valuable part of their work within the profession, as research was becoming more important to their field.

Respondents predominantly showed a positive orientation toward research, particularly towards the end of the project. However, the research journey typically started with a neutral or negative disposition for this group on the whole. The areas of concern identified in the journey plots for this cohort were in the early phases of the project, namely formulation of the research proposal and completion of ethics, which had negative impacts on the journeys of the students. The impact of literature as an event was also an area of concern to students, however, this area was perceived with confidence by students in the Research Self Efficacy scales. Progress within the project indicated that students felt the project was not running smoothly at different stages of the journey.

These results indicate a number of areas which can be examined to strengthen the research experience for this group of students to make the start of their journey more positive. Another indicator of concern for this group which can be explored in the design of the Embedded Honours courses is coursework, which was an event which caused deep concern to many students. The nature of the fourth year of a professional degree in many cases hampers the immersion in a research project, as students are expected to complete electives and work-based experience in their final year.

10.4.3 The 'Teacher Research Project' experience

Students in this study completing a practice-based research project from the Education disciplines comprised 57% of respondents to the questionnaire. There were nine different specialisations represented, with the majority from the Primary Teaching program. The students who met most frequently with their supervisor and showed higher research self efficacy were most likely to want to undertake postgraduate study and reacted positively to good personal support and a feeling of belonging to a research 'community'. However, many felt they were 'unconnected' to a learning community, and specifically to their supervisor. This was not a surprising finding given the large number of students allocated to each supervisor. Because the students were at different schools during their internship, it was not possible to use any model of group supervision.

Among the cohort there was a general belief that they could handle the skills required in the Research Project, although there was evidence that many students experienced frustration in developing research questions and undertaking a literature review within a restricted time frame. This may have been exacerbated by the compressed delivery of the program, the reliance given to on-line support to teach students research skills, and the lack of contact with the academic supervisors. Typically students started off shakily but were optimistic about the outcome. The findings raise the question of how best to support and scaffold students in their early research endeavours within a mandatory program which constituted a minor part of their fourth-year program. The students need to feel they can perceive positive progress in the research rather than feel alienated by the effort required in a busy program.

There is an impetus for further study of the integration of research into the professional training of pre-service teachers given the recent reviews of Australian higher education (Bradley et al, 2008; House of Representatives, 2008). Indeed, there was overwhelming evidence that primary and secondary years need to be seen as critical for developing a love of learning, an interest in research and an awareness of career opportunities with research (House of Representatives, 2008, p.6). This raises the question of how teachers who are dissatisfied with the experience of research, or who have not experienced research at all, can engage meaningfully with students about research within the primary and secondary classroom. Clearly, fostering an understanding and appreciation of research should be a focus in pre-service teacher education.

Teachers are increasingly facing the pressure to provide evidence of ongoing professionalism, and to base their practice on a body of professional knowledge. It would appear that an undergraduate research project linked to internship placement does develop research awareness, but the awareness was not always positive. It would be unlikely in any case that all members of any profession would have a predisposition to research. Even within a comparatively minor part of the fourth-year experience, it is important to foster positive attitudes to research and ensure that more effort is put into identifying and supporting those education undergraduates who are motivated to undertake postgraduate study or research in the future. It is this group, we know from other research, who will very likely become the leaders in and model evidence-based practice (Holbrook et al. 2000, p.29).

The group of pre-service teachers in this study who were unsure about continuing with research studies are of particular interest. Members of this group were still open to the notion of continuing to higher research degrees and at the very least were teachers who could engage in research in a professional context with some support or encouragement. This study suggests that increasing confidence in carrying out research tasks, particularly at the beginning of their research project, would influence their intention to continue research in the future. This is an area which requires further research both in terms of encouraging more education students to continue to the academy and in providing teachers with the experience necessary to integrate the process of research into the primary and secondary curriculum.

In the long term, commentators are calling for a shift in the way research is perceived to compete in the changing global environment, moving beyond the boundaries of traditional modes of thinking. A future direction in the national arena is to foster the curiosity and potential for research in younger children before they reach university. More innovative approaches to giving young children opportunities to discover new ways of thinking in a knowledge production society are required and warrant further investigation.

10.5 Limitations of the Study

One of the key limitations of the study was in the data collection phase, where it was difficult to attract participants for the study at the end of their Honours experience. For this reason, most of the data collected was reliant on the participation of faculty members in the first phase of the data collection, who coordinated the Honours programs and fourth-year research projects. Given that the site also commenced a re-structure process, in the midst of the data collection, finding the appropriate staff member was also difficult. This was particularly the case in the Arts-based disciplines, where there were a number of key staff members who left the university.

The data collection phase was also influenced by the meeting structures in place at the end of the project. Most of the disciplines which had participants in this study had end-of-year seminars, where students were required to present their data. This may have a bearing on the results, as students who have to present in front of their peers and prospective colleagues may be more motivated to do well in their research and also be more confident in the research tasks. Where questionnaires were mailed to participants at the end of their research project there was a very low response rate, and as many of the students had completed their studies it was then difficult to implement follow-up strategies.

The data collected from the fourth-year education students was treated separately given that the only opportunity to administer the questionnaire was at their last professional preparation lecture, as they were involved in their final year teaching internship and would not be expected to return to the campus as a group. The other limitation with the Education data is that the research project accounted for only one-eighth of the final-year student workload, far less than that for students in all other disciplines. Nevertheless the data were valuable in informing the literature about the research experiences of pre-service teachers and how they experienced the project in a discipline that has long-standing issues with the role of research in the profession (Shaw, Holbrook, Scevak & Bourke, 2008; House of Representatives, 2008).

10.6 Findings and contributions to further study

This study provides more detail and depth of analysis of Honours experience than has previously been achieved, not only from a cross-discipline perspective (ie analysis of programs and disciplines) but also through the development and use of a new methodology – the comparative journey plot. Additionally, the intention of Honours students to continue to research higher degrees has implications for the recruitment of research students in higher education. There has previously been little attempt to investigate whether earlier experiences of a research project better assists in preparing students for the challenges experienced in doctoral research. This study proposes a measure of research preparedness as a predictor of future research interest and success. This shifts the gaze from predictors of success evident within doctoral programs (so common in the doctoral research literature) to preparedness at undergraduate level. The experiences of Honours students showed that there were varying levels of preparedness for research and identified indicators which influence the research experience in different types of programs.

Given the current interest in Honours in relation to the global changes in higher education, and the paucity of literature available, the author also makes suggestions for the future of Honours in the Australian higher education context to contribute to current debate.

10.6.1 A more thorough understanding of the fourth-year research student experience

There is very little doubt that the research landscape and, in particular, the doctoral landscape is changing with ramifications for transitional routes and pre-training. Questions are currently being raised about the relevance of research training and whether the practices in doctoral education are meeting competing agendas (Boud & Lee, 2009). Indeed, some are asking whether we should re-imagine the doctorate and what lies beyond it as the notion of scholarship continues to develop with new generations of researchers (Lee, Brennan & Green, 2009).

The traditional role of Honours as preparation for a career in the academy is no longer the only intended role of Honours in Australian higher education. As found by Kiley et al (2009) the Honours degree also serves a role in preparing future graduates for the workforce. Not all future researchers will be based in the university context, as a proportion of research currently being undertaken occurs within industry (McWilliam et al, 2002). The end of the binary divide, and the incorporation of professional education into universities, has changed the way knowledge is viewed, with industry gaining greater influence over the type of research produced and the ways researchers are trained to be able to contribute new knowledge to the profession. The introduction of professional doctorates has also contributed to this changing landscape, with an increase from one professional doctorate on offer in 1990 to 131 identified programs in 2001 (Boud & Tennant, 2006). A high proportion of the undergraduate researchers in this study are engaged in research projects based in practice, with the majority of respondents in Embedded Honours programs indicating that they had contact with their industry whilst carrying out their research projects, particularly in Engineering, Speech Pathology and Construction Management disciplines. In describing the student experience of fourth-year undergraduate research projects as precursors for entry into doctoral programs, a clear theme emerged through the interviews and journey plots of the wide range of undergraduate research experiences in one institution. There was clearly a variety of approaches used in making the Honours year an integral component in the transition from course-taker to producer of knowledge, similar in concept to the work of Lovitts (2008) on transition to doctoral research.

The quantitative component of the study yielded findings about the student experience which have not previously been published. In particular, the analyses by type of fourth-year program showed a continuum of interest in research for the respondents, based on the nature of the research project. For the select group of End-on students, for whom the decision to conduct a research project was voluntary and where the research project was predominantly the focus of their program, the experience of conducting research was a positive one which they felt prepared them for further research studies. For those respondents in Embedded fourth-year programs, for whom the project was compulsory and the research project competed with other professional preparation demands in the program, the respondents exhibited a lower level of preparedness and intention to continue with research. For the Teacher Research Project, which comprised only a small component of the fourth-year program, the respondents were largely disinterested in continuing with research. Even so, a strong signal received by some students from the profession in the early stages of their research project led to a stronger connection with the academic learning community and more confidence in carrying out the research tasks.

This study contributes to a deeper understanding of the experience of carrying out practice-based research. Even though the experience within the End-on programs showed greater evidence of research preparedness, most of the Embedded-Honours group also perceived that they were prepared for research. The findings also suggest that the inclusion of a research project in the fourth-year of a professional-based degree linked with industry may have benefits in both imbuing students with confidence in the research process and encouraging students to integrate research skills in professional practice. This is critical given the drive for knowledge production and the strategic use of knowledge in the global economy. Indeed, some of the more innovative methods of integrating research into practice-based communities are occurring at the Honours level, as demonstrated by the scenarios presented in Chapter Five, particularly for those disciplines without a long doctoral tradition. The comments from some of the respondents also indicated that they intended to use their research in the workplace or alternatively return to academic study after gaining experience in the work force.

10.6.2 ‘Intention’ and its implications for recruitment

Intention was used in the study to represent the degree of interest in continuing on to further research studies. Findings from this study suggest that the student intention to continue on to further research study differs across different types of program. Further, there are identifiable milestones along the journey which impact on the degree of interest a student has in continuing in their research studies and induction programs could be designed to focus on these areas to support students where they need it most to alleviate the intensity of the highs and lows.

Providing more support to students throughout the project was found to be likely to increase Honours students intention to continue to further study. The proportion of time allocated to the fourth-year research project within the fourth-year program also needs to be substantial to make the experiences for students worthwhile. The value of the End-on program, for example, is that only interested students participate resulting in a smaller number of candidates and the use of effective supervision models. In addition, the resources used to support students can be concentrated, resulting in a stronger perception of support from students, as seen in the journey plot data for End-on Honours students. The nature of the coursework accompanying the thesis in End-on programs also increased the student's confidence in carrying out research tasks, as it was designed in most cases to support the research thesis – either through research training or in discipline specific knowledge or workshops with experts in the field.

In professional-based fields, in particular, the postgraduate research sector is in direct competition with the workforce given the current climate of low professional unemployment. There are concerns that vocational training has neglected research skills development, leaving students ill-equipped to contemplate a research career (House of Representatives, 2008, p.87). This study suggests that undergraduate students in professional-based fields in university settings are increasingly involved in research projects linked with practice-based contexts, and that students engaged in these projects are overall confident in their ability to complete research tasks at the end of their fourth year of study.

An institution-wide policy governing recruitment for Honours and research higher degrees would help to clarify the recruitment processes for prospective students. Also the development of a framework to situate Honours in the global education framework would be beneficial on a national scale. Perhaps as suggested (House of Representatives, 2008, p.71) increasing the amount of the Australian Postgraduate Award would make research degrees a more attractive proposition for talented prospective researchers and offer students adequate means of financial support to focus on research. For graduates intent on entering the workforce, research in the workplace as an early career researcher could be encouraged through continuation of study within a professional doctorate program linked to, and supported by, their employer.

10.6.3 Making visible the Undergraduate Research Experience

In the doctoral education literature there are increasing numbers of studies focusing on individual journeys, with some turning to metaphor and representation to try to elucidate the experience. Most of these studies are descriptive, and hence it is difficult to compare student experiences across different disciplines and types of program. In addition, little is known about the intensity of the research experience for undergraduate research students, or how the process of research impacts on their perception of the journey. The development of a new methodology, the journey plot, was devised as a way of quantifying the journey so the student experience could be compared across different programs. Students were asked to self-identify the important events along the journey and to convey whether the events were positive or negative in nature. This method contributes to the journeying literature, enabling a visualization of the experience for each respondent which was directly comparable to other respondents in the study.

The key identifiers of the journey were the start and end points and the 'highs' and 'lows'. These indicators enabled the journey to be classified into nine different types (see Chapter Six). The end point was predominantly positive, given that students were elated to complete the project. The start point, however, proved a valuable indicator and is used as one of the factors in the research preparedness score. The early stages of research candidacy are crucial, as the formulation of a research questions can sustain the entirety of a successful candidature (Ingleby, 2007).

Selecting the right topic is one of the major problems that graduate students mention. Bowen & Rudenstein (1992) stated that many doctoral students spent one to two years looking for a research topic, not having enough experiences with other major research projects before initiating their own research project. Honours students do not have the luxury of time in a crowded one-year program, either in a lengthy re-framing of the questions or to utilize recursive research practices as recommended by Willison & O'Regan (2007). The research topic is also identified as an area where more support can be given at the commencement of the undergraduate and postgraduate research degrees, particularly for End-on students, for which the research topic and questions were clearly identified as having a negative impact on their journey.

The research journey added a depth of detail previously uncovered in the literature about student experience. The individual nature of the experience was presented through illustrative journeys of a selection of students whose profiles were outlined in Chapters Seven, Eight and Nine. Respondents were able to self-identify events which had an impact on their journey, resulting in a wider scope in the reporting of the milestones in the research process. The journey plot identifies tasks in undergraduate research which pose challenges for students as a whole, and also compare the elements of the journeys across programs. The value of this new measure lies in its capacity to make the process of research visible, as shown in Table 62, which illustrates the positive and negative events along the journey for students in the different types of programs.

Table 62: Positive and negative events for students in different types of Honours programs

Type of Program	N	Positive Events	Negative Events
End-on Honours	49	Coursework Literature-related Tasks Learning Community	Research Topic & Question Motivation Ethics
Embedded Honours	50	Research Topic & Question Motivation Research Support	Coursework Ethics Feelings & Expectations towards research
Teacher Research Project	63	Research Question Data Collection	Coursework Research Topic Ethics Research Environment Feelings & Expectations towards research

Despite indications in previous studies at higher-degree level that the literature review would be an area of concern for beginning research students, student respondents did not perceive this to be a challenging phase of their research journey, the End-on students identifying it as a positive event on the whole. However, it may be that these beginning researchers did not realize the importance of the literature in framing their study, or the impact the literature review may have on the outcome of the examination of their thesis. A challenge that was identified by Honours students in this study was the process of obtaining Ethics approval. Far from being a process which is learned in the early stages of research, Ethics is depicted by students as a hurdle which must be overcome. Research supervisors need to be aware of this tendency, because students who experience a low in their undergraduate studies related to ethics are also more likely to view the process negatively when commencing a larger research project. This issue has also been identified in the literature and the solution includes emphasizing the positive role of research ethics and ethics education (as noted by Williams, 2009) throughout the undergraduate degree program.

A key finding from the journeys which was not identified elsewhere in the study, for example in the development of scales, was the impact of coursework on the research experience of the students. Predominantly students involved in End-on programs found coursework to be a positive event overall, whereas those involved in Embedded research projects found coursework to be one of the most negative experiences of the journey. This gives some direction for those designing Honours programs, as coursework in the End-on programs consisted predominantly of the research thesis and any other courses offered consisted of programs to enhance the research experience such as research training or development of theoretical knowledge of the discipline. In contrast, in the Embedded Honours programs students were still completing components of their professional program including specialist electives and in many cases a practical experience in the field. In all cases the thesis made up less than a third of the fourth year work load.

The research journey plot data suggests, from the students' perspective, some of the places within their undergraduate research journey where they have become 'stuck' in the form of low episodes in their experience of research, and from the journey plot we can visualize how students then emerge from these 'stuck places' to continue their journey and successfully master a new way of thinking within their discipline (Kiley & Wisker, 2009). The visual plot illuminates key indicators.

Overall this research suggests that the disposition of a student at the commencement of a research project contributes to their preparedness to complete the research task and how they perceive research. Those students enrolled in End-on programs mainly started their journey with a positive disposition, and these students also had an overall positivity about research which emerged from their comments about the process of research and the research environment. Although they experienced challenges along the way, they were more likely to view those challenges in a positive way at the completion of their study. They had more positive relationships with the learning community and were more supported in their study. In comparison, the students in the Embedded Honours programs had more negative events identified along their journeys and, as shown in Table 62, were more likely to have negative feelings towards their research. It stands to reason that as such the End-on research journey provided the best transition to further study, and this is an area which can be further investigated through a longitudinal approach.

10.6.4 Shifting the gaze: Indicators of 'Preparedness' for doctoral research

Currently researchers in the field of doctoral education, particularly in the United States, are exploring how research students undergo the transition from course-taker to a producer of knowledge within a discipline (Lovitts, 2008; Golde, 2007; Golde & Dore, 2001). Australia has a relatively unique approach to research preparation through the undergraduate Honours pathway. Findings in this study raised the question as to whether students completing their fourth-year research project demonstrate varying levels of preparedness, depending on the type of program they are undertaking, and whether at this early stage of the research continuum the indicators of preparedness are more closely bound within the disciplinary context.

This study builds on studies focused on how research students can be given the best possible start to their PhD. At the start of this study the purpose was to investigate the experience of students undertaking undergraduate research across different programs. As differences emerged in the structure and role of Honours programs, diverse approaches to recruitment and selection of students capable of continuing with research studies were highlighted. How students engaged in the process of becoming a researcher also contributed to their perceived 'research preparedness' and to whether they intended to continue with research. This was of interest given the high attrition in doctoral programs globally, which can be as high as 50% (McAlpine & Norton, 2006; Lovitts & Nelson, 2000) and was conceived as a way to minimise the risk of failure. A construct of research preparedness was explored. It was envisioned that once enrolled in a doctoral program, research-prepared students would then be propelled through the doctoral research program given predictors based on their approach to learning, confidence in carrying out research tasks, their familiarity with the research environment and their positive orientation towards research.

This study found that those students in an End-on Honours program who were confident in their ability to carry out research tasks were more likely to intend to continue on to further research studies. The findings suggest that the element of self-belief does influence undergraduate student's engagement in research tasks, given that it was the strongest factor in the research preparedness score. Research self efficacy has been found to predict graduate student's interest in conducting research and their actual research involvement and productivity and is an area gaining momentum in the area of research in the United States (Forster et al, 2004). The idea was adapted for use in this study to explore undergraduate student self-belief in their ability to complete research-related tasks in an undergraduate research project and whether this confidence would predict an interest in continuing on to postgraduate research studies.

Coordinators of Honours programs indicated that confidence was a key outcome of Honours research for students interested in continuing to further research studies. They identified a predisposition to research - how students took to research 'like a fish adapts to water', showed tenacity and an orientation towards research which has been previously undiscovered in an undergraduate coursework degree. They described this quality as a ‘hidden potential’ for research. This predisposition, combined with preparedness for research within a disciplinary field of knowledge, constitutes a powerful indicator of the capacity to be a researcher.

The findings from this study challenged the notion of ‘research preparedness’ envisioned at the conception of the study. What was evident was not so much a ‘readiness’ but an indicator that the student has a capability for research within a specific disciplinary context. Some undergraduate students at the end of their program have the capacity to immerse themselves in the discipline to such an extent that they have a curiosity to discover more, to search out new knowledge. They have a certain predisposition for research which performance in coursework subjects does not uncover. It was found that the End-on Honours program is performing this best, particularly in the laboratory-based disciplines. The results of this study added weight to the findings that students involved in laboratory-based research had a stronger intention to continue with research studies (Mullins, 2006) and that a science-based discipline is a predictor of completion in doctoral studies (Sinclair, 2005; Wright & Cochrane, 2000).

An aspect for future study could be to concentrate on the transitional period from Honours to doctoral research, to see if those with a higher research preparedness score complete in a shorter time or have a lower attrition rate. The examiner reports for students with a higher preparedness score would also be of interest to see if preparedness results in a better quality of thesis.

10.6.5 The potential role of Honours in global higher education landscape

Increasingly research and scholarship are being viewed as the key to our prosperity and future as a nation (Boud & Lee, 2009). With the emergence of the internet, and the increased access to information, the way knowledge is perceived is constantly changing. Research generates new knowledge, whether it is within a university department or situated in a professional context, and the generation of new knowledge is seen as a strategic resource to countries globally (Kehm, 2007). In particular, those students involved in original and ground-breaking research are needed to 'dissolve rigid educational structures' and engage in new forms of research to break down disciplinary boundaries (Tierney & Holley, 2008). Researchers of the future will require ways of thinking about knowledge that are not constrained and which are applauded for their innovation (Harkins & Kubik, 2006).

Australia can be viewed as having a number of advantages in graduate education: equal access for all students; national doctoral guidelines; and the national oversight of programs through the Australian Qualifications Framework and of quality through the Australian Universities Quality Agency (AQUA). Though undergraduate research programs such as Honours share many characteristics of research higher degrees, there are none of the guidelines or measures of quality undertaken across universities (Zeegers & Barron, 2008a). It bears consideration that the strength of Honours lies in the diversity of programs, allowing the scope for beginning researchers to innovate and think in visionary ways within their disciplines and to connect with the people within their learning community. As shown in the first phase of this study, the idea about the ways student research skills developed, collected from coordinators, was very different in detail yet encapsulated excitement and passion as students became more curious about the potential of their ideas and about creating new knowledge.

This study highlights the importance of the diverse roles that Honours programs play in the Australian higher education system. Both End-on and Embedded programs produce graduates with a capacity for research. As a whole, the fourth-year research students in these two types of programs are confident in undertaking research and draw on appropriate motivational strategies to enable them to learn from the tasks they are undertaking. They also show an orientation to research, through their understandings of the nature of the journey, and the highs and lows experienced, exhibiting resilience towards challenging tasks and a determination to complete the tasks at hand.

Honours graduates are ‘fast-tracking’ their way at an early age to doctoral research degrees and to higher levels of professional standing within their disciplines. With increased national consistency in tracking pathways for our highest levels of scholarship, and a more current rationalization of scholarship criteria for doctoral study, Honours will continue to be a crucial step for students in their passage to research higher degrees or producing new knowledge in the workplace. It is clear from this study that Honours is a significant and integral component of Australian higher education, encouraging young and bright students to prepare for their future in an innovative knowledge production society. Far from being an antiquated system Honours has evolved into a dynamic and modern system in response to rapid changes in the local and global higher education research arena. Moreover, this study proposes a nascent framework for further investigation in a national context.

As demonstrated in this study, the scope and diversity of the fourth-year research programs, modeled on the needs of the immediate stakeholders, is a vital aspect in developing curious and tenacious potential researchers. As such, any attempt to standardise the training of research students across disciplines should be cautious. It is through providing a substantial early experience of research in undergraduate education that confidence in the capacity to carry out research can develop and, equally, potential research talent can be uncovered. The next challenge for Australia is to provide the incentives for students across disciplines to pursue careers in research, and in academe, to sustain the on-going development of disciplines and to keep pace with the changing global emphasis on research.

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12. APPENDIXES

12.1. List of Appendixes

1	Letter to Participants – Interviews
2	Consent and Release Form – Interviews
3	Email to Participants – Interviews
4	Interview Protocol – Interviews
5	Student Questionnaire
6	Questionnaire Scales with Items and Factor Loadings
7	Journey Plot Coding Procedure
8	Journey Plot Coding Form and Grid
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10	Correlation with all Scales and 'Research Involves Group' for End-on Honours
11	Correlation with all Scales and 'Contact with Profession' for Teacher Research project
12	Correlation with all Scales and 'Intention to Continue' for Teacher Research project
13	Sample Transcripts

12.2 Appendix 1: Letter to Participants - Interviews

Mrs Kylie Shaw
SORTI
University of Newcastle
Telephone: 0417 268 143
Fax: (02) 4952 3757
E-mail: k.shaw@studentmail.newcastle.edu.au

Supervisor Contact Number: Associate Professor Allyson Holbrook
(02) 4921 5945

Dear Faculty Member

My name is Kylie Shaw and I am a PhD student in the Faculty of Education at the University of Newcastle. My supervisor is Associate Professor Allyson Holbrook. I am writing to seek your participation in my study titled '*An investigation of fourth-year programs in Australian universities: Their role, the importance of their contribution and the quality of student experience'.*

As a senior faculty member in your university, you have unique and valuable knowledge of fourth-year programs integral to the study being undertaken. Documentary information can only uncover so much about the current status and role of fourth-year programs in universities, and this study is seeking to explore areas such as the contribution to research training and the development of research culture. Your assistance in this study, by participating in an interview (about 20 minutes duration) would be most appreciated.

Participation in the study is entirely voluntary and should you wish to withdraw your participation in the program at any time there will be no questions asked. This information will also constitute an important historical archive, given that university programs are changing so rapidly. I seek your permission to store the tapes and transcripts for that purpose at my university. An edited transcript of the interview will be available upon request after the interview session. Should you wish to change, add to or remove any part of the transcript you may do so at any time. Interview tapes and transcripts, without identifying information, will be stored in a locked filing cabinet accessible only to the key research personnel. If you do not consent to have the tape and transcript archived, the tape will be destroyed upon completion of the project, December 2005.

I propose to commence interviewing in 2006 and complete interviewing by July 2008. I will be happy to provide you with a report at the conclusion of my study and to alert you to any published material that emerges from the study if requested.

Thank you for considering my request to be involved in the study. Please fill in the attached consent form if you are willing to participate.

Yours sincerely,

Kylie Shaw (PhD Student) Associate Professor Allyson Holbrook (Supervisor)

This project has been approved by the University's Human Research Ethics Committee, Approval No. **H-408-0802**. Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to the Human Research Ethics Officer, Research Office, The Chancellery, The University of Newcastle, University Drive, Callaghan NSW 2308, telephone (02 49216333, email Human-Ethics@newcastle.edu.au.

12.3 Appendix 2: Consent and Release Forms - Interview

Mrs Kylie Shaw
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Telephone: 0417 268 143
Fax: (02) 4952 3757
E-mail: k.shaw@studentmail.newcastle.edu.au

Supervisor Contact Number: Associate Professor Allyson Holbrook
(02) 4921 5945

CONSENT FORM - for the study of 'An investigation of fourth-year programs in Australian universities: Their role, the importance of their contribution and the quality of student experience.'

YOUR COPY

I, ____________________________ agree to participate in the project investigating fourth-year programs in Australian universities and give my consent freely. I understand that the study will be carried out as described in the information statement, a copy of which I have retained. I realise that it is my decision to participate in this study, and that no one is coercing me to do so. I also realise that I can withdraw from the study at any time and do not have to give reasons for withdrawing. I have had all questions answered to my satisfaction.

Signed: __________________________________ Date: ________________________

This project has been approved by the University's Human Research Ethics Committee, Approval No. **H-408-0802**. Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to the Human Research Ethics Officer, Research Office, The Chancellery, The University of Newcastle, University Drive, Callaghan NSW 2308, telephone (02 49216333, email Human-Ethics@newcastle.edu.au.

CONSENT FORM - for the study of 'An investigation of fourth-year programs in Australian universities: Their role, the importance of their contribution and the quality of student experience.'

MY COPY

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Signed :__________________________________ Date : ________________________

I would/would not like to be sent a report at the conclusion of the study and to be alerted to any published material resulting from the study.

Please email it to me at: ____

Please tear off and return to Kylie Shaw in attached envelope or send internally to: Mrs Kylie Shaw
SORTI
University of Newcastle

SORTI
University of Newcastle
Telephone: 0417 268 143
Fax: (02) 4952 3757
E-mail: k.shaw@studentmail.newcastle.edu.au

Supervisor Contact Number: Associate Professor Allyson Holbrook
(02) 4921 5945

RELEASE FORM - for the study of 'An investigation of fourth-year programs in Australian universities: Their role, the importance of their contribution and the quality of student experience.'

YOUR COPY

I, ___________________ agree / do not agree to have the interview tapes and transcripts of interviews recorded on the following dates _______________________ by Kylie Shaw archived at the Centre for the Study of Research Training and Impact (SORTI) . I understand that if these tapes and transcripts are archived they will be available for future use in research by the Centre and that all identifying information will be removed.

Signed (Participant): _______________________________ Date : ________________________

Signed (Researcher): ______________________________ Date : __________________________

This project has been approved by the University's Human Research Ethics Committee, Approval No. **H-408-0802**. Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to the Human Research Ethics Officer, Research Office, The Chancellery, The University of Newcastle, University Drive, Callaghan NSW 2308, telephone (02 49216333, email Human-Ethics@newcastle.edu.au.

RELEASE FORM - for the study of 'An investigation of fourth-year programs in Australian universities: Their role, the importance of their contribution and the quality of student experience.'

MY COPY

I, ________________________ agree / do not agree to have the interview tapes and transcripts of interviews recorded on the following dates _______________________ by Kylie Shaw archived at the Centre for the Study of Research Training and Impact (SORTI) . I understand that if these tapes and transcripts are archived they will be available for future use in research by the Centre and that all identifying information will be removed.

Signed (Participant): _______________________ Date : ____________________

Signed (Researcher): _______________________ Date : ___________________

Please tear off and return to Kylie Shaw in attached envelope or send to:

Kylie Shaw
SORTI
University of Newcastle
Callaghan NSW 2308

12.4 Appendix 3: Email to Participants – Interviews

Dear

I am a doctoral student conducting research with the Faculty of Education looking at the experience of fourth-year students across all faculties within the university, including those completing their Honours and fourth-year research projects. As an Honours or research project coordinator, I would be very appreciative if you could participate in a 15-20 minute interview about your experience with students involved in completing minor theses and research projects in your discipline.

I have attached a formal letter requesting your participation in the study, and also an outline of the questions for the interview. I am happy to interview you in the order presented in the interview protocol, or if you feel more comfortable with an alternate arrangement please let me know.

I am also seeking to distribute a questionnaire to students completing Honours or a research project in your discipline, and would appreciate your advice on the best way to disseminate the questionnaire in your discipline. I am able to attend a lecture or tutorial to distribute the questionnaires or attend a meeting if this is a possibility. I have also attached a copy of the questionnaire for your information.

If you are able to participate it would be great if you could let me know a time and location that would suit you (preferably in the next few weeks) or email me back the name of a more suitable contact.

Many thanks
Kylie.

12.5 Appendix 4: Interview Protocol

Q1 How is Honours/fourth year structured in your faculty/school/program?

Q2 What is your role in relation to Honours/fourth year in your faculty/school/program?

Q3 How are Honours students recruited and notified in your faculty /school / program? (leave out for fourth year)

Q4 What proportion of Honours/fourth year students in your faculty/school continue on to research higher degrees?

Has this changed over time?

Q5 What do you think are the reasons for this change, if any?

Q6 What is the primary reason for offering Honours/fourth year research project?

Q7 To what extent is Honours/fourth year research project valued by your faculty/school/program?

Q8 In your estimation, what are the key outcomes of Honours/fourth year research project for students?

Q9 Do you have any particular stories or incidents which best describe how student's skills develop during the Honours/fourth year?

Q10 How typical is it in your faculty/school for research students to be employed on research grants? If it is typical, how often?

Q11 How desirable would it be for Honours/fourth year students to be employed in research projects?

Q12 Is there anything else we haven't covered that you would like to add to our discussion about Honours/fourth year?

12.6 Appendix 5: Student Questionnaire

The Student Questionnaire was administered to students in their fourth year of study if they were enrolled in a course involving a research project. The Student Questionnaire took approximately 15-20 minutes to complete.

FOURTH YEAR QUESTIONNAIRE

ID: ____________________

PROJECT:

An investigation of fourth year programs in Australian universities: Their role, the importance of their contribution and the quality of student experience

RESEARCHERS:

Kylie Shaw (PhD Student)

Address: Head of College
International House
University of Newcastle
CALLAGHAN NSW 2308

Phone: 02 4924 1455
Email: Kylie.Shaw@newcastle.edu.au

Associate Professor Allyson Holbrook (Supervisor)

Address : Director, SORTI
Centre for the Study of Research Training & Impact
Newbold House
Corner Gavey & Frith Street
MAYFIELD NSW 2304

Phone : 02 4968 6710, 02 4921 5945
Email : Allyson.Holbrook@newcastle.edu.au

Website: http://www.newcastle.edu.au/centre/sorti

INFORMATION SHEET

INVESTIGATION INTO FOURTH YEAR PROGRAMS AT AUSTRALIAN UNIVERSITIES

Dear Student,

You are invited to participate in a doctoral study into the quality of student experiences in the fourth year of university. You are eligible to participate if you are currently enrolled in the fourth year of your Bachelor degree (for four year and five year Bachelor programs eg. Bachelor of Engineering, Bachelor of Medicine) or are enrolled in an Honours Year (for three year Bachelor programs eg. Bachelor of Arts).

The purpose of this study is to map fourth-year programs across all Australian universities, and to specifically investigate fourth-year programs at the University of Newcastle. Of interest is the role of fourth-year programs, the importance of their contribution to the Australian higher education sector and the quality of the experience of fourth-year students.

As a fourth-year student you have unique and valuable knowledge about fourth year integral to the study being undertaken. Your time in filling in the attached questionnaire is greatly appreciated. It should only take about 30 minutes to complete. Your involvement is strictly confidential and anonymous. You are not required to write your name on the questionnaire.

Participation in the study is entirely voluntary. This project has been approved by the University's Human Research Ethics Committee, Approval No. **H-408-0802**.

Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to the Human Research Ethics Officer, Research Office, The Chancellery, The University of Newcastle, University Drive, Callaghan NSW 2308, telephone (02 49216333, email Human-Ethics@newcastle.edu.au.

Please do not hesitate to contact me, or my supervisor, if you require more information about the study.

Yours sincerely,

Kylie Shaw (PhD Student)
Bachelor of Education (Hons)
Faculty of Education & Arts
University of Newcastle
02 4924 1455

Associate Professor Allyson Holbrook (Supervisor)
Director
SORTI
University of Newcastle
(02) 4921 5945

FOURTH YEAR QUESTIONNAIRE

This questionnaire is anonymous and all answers will be treated in the strictest confidence. Please ensure that you complete all parts of the questionnaire.

PART A

GENERAL INFORMATION (Please tick the appropriate box)

A1 What is your gender?

- ☐ male
- ☐ female

A2 What is your age at your last birthday?

- ☐ 20 years and under
- ☐ 21-24 years
- ☐ 25-34 years
- ☐ 35-49 years
- ☐ 50+ years

A3 What form/s of financial support do you have as a student?

- ☐ Youth allowance
- ☐ Scholarship/s
- ☐ partner/parent/family
- ☐ personal savings
- ☐ current employment
- ☐ loan
- ☐ Other, please specify

____

A4 Have you already been awarded with a degree?

- ☐ no
- ☐ yes, please specify name of degree

____

A5 What is your nationality?

- ☐ Australian
- ☐ Other country, please specify

____

A6 Have you had a break in study at any time during your university study (ie year off during degree, before starting an Honours program)?

- ☐ no
- ☐ yes, please specify at what stage and the duration of the break

____

____

INFORMATION ABOUT YOUR PROGRAM

A7 What is the name of the degree you are studying in 2005?

____

A8 What School are you enrolled in?

____

A9 What is the main mode of teaching of your program in 4th year (indicate % in a normal week)?

___% lectures

___% tutorials

___% one-to-one supervision

___% workplace practicum

___% other, please specify

____

A10 What is your enrolment status?

- ☐ full time student
- ☐ part time student

A11 Do you intend to undertake postgraduate studies?

- ☐ Yes
- ☐ No
- ☐ Unsure

INFORMATION ABOUT RESEARCH COMPONENT OF YOUR COURSE	
A12 What percentage of your course this year is research? ☐ 25% ☐ 50% ☐ 75% ☐ 100% ☐ Other please state_______________	**A17** What is the best description of frequency of contact with your supervisor/s for your research project? ☐ Weekly ☐ Fortnightly ☐ Monthly ☐ Other, please specify ____________________
A13 Does your program provide specific training in research methods or approaches? ☐ Yes ☐ No If yes, is there a specific course devoted to this? ☐ No ☐ Yes, please specify _____________________	**A18** What facilities and/or resources do you require for your research? ☐ Access to science laboratory ☐ Access to computer lab ☐ Access to a workplace (ie school, construction site, engineering firm, etc) ☐ Other, please specify____________________ ____
A14 Does your research involve contact with industry and/or members of your profession? ☐ Yes ☐ No	**A19** Does your university faculty or school provide facilities (or organise appropriate resources) to enable you to carry out your research? ☐ None ☐ Some ☐ A lot
A15 Does your research involve working with a research group? ☐ Yes ☐ No	**A20** Does your supervisor have expertise in your area of research? ☐ Yes ☐ No ☐ Unsure
A16 What level of involvement did you have in the choice of the topic for your research project? ☐ None ☐ Some ☐ A lot	**A21** What gender is/are your supervisor/s (indicate by putting a number in each applicable box for the sex of each supervisor)? ☐ Male/s ☐ Female/s
A22 If you are studying an Honours year, what factors contributed to you choosing to do Honours? (Tick all that apply) ☐ Lecturer/tutor personally asked you to continue on from your Bachelor degree ☐ Written invitation / information session from Faculty ☐ Other students recommended Honours ☐ Was not ready to leave university yet ☐ Desire to continue on to postgraduate research ☐ Have had a break from study and want to continue on to higher degree ☐ Family or close friends ☐ Other, ____	

PART B

Below you will find a series of statements relating to your behaviour in your course. Please indicate on the 1 to 6 point scale whether you agree or disagree with the statement by ticking in the box.		Strongly disagree	Disagree	Tend to disagree	Tend to agree	Agree	Strongly Agree
B1	Understanding this course is important to me						
B2	When work is hard I give up or study only the easy parts						
B3	It is hard for me to decide what the main ideas are in what I read						
B4	I feel I belong to the faculty community						
B5	I have access to adequate library resources						
B6	I think what I am learning in this course is useful for me to know						
B7	Before I begin studying I think about the things I will need to do to learn						
B8	When I study I put important ideas into my own words						
B9	I feel I belong to the university community						
B10	I belong to student associations on campus						
B11	I am able to explore academic interests with students and staff						
B12	I like what I am learning in this course						
B13	I am able to use electronic journals, databases and search engines effectively						
B14	Even when study is dull and uninteresting, I keep working until I finish						
B15	I experience feelings of isolation when carrying out research						
B16	I have access to study areas within the School						
B17	When I am studying a topic, I try to make everything fit together						
B18	I have a close network of fellow students						
B19	I have access to interlibrary services						
B20	I prefer work that is challenging so I can learn new things						
B21	When I am reading I stop once in a while and go over what I have read						
B22	When reading I try to connect the things I am reading about with what I already know						
B23	I can talk to lecturers about problems I am experiencing						
B24	I have effective time management skills						

B25 Please describe your main project methods (tick all that apply)

❑ Experimental	❑ Quantitative	❑ Observation	❑ Laboratory
❑ Statistical	❑ Survey/questionnaire	❑ Field work	❑ Other, please state
❑ Interview	❑ Qualitative	❑ Document analysis	____________________
❑ Philosophical	❑ Exhibition/installation	❑ Focus groups	

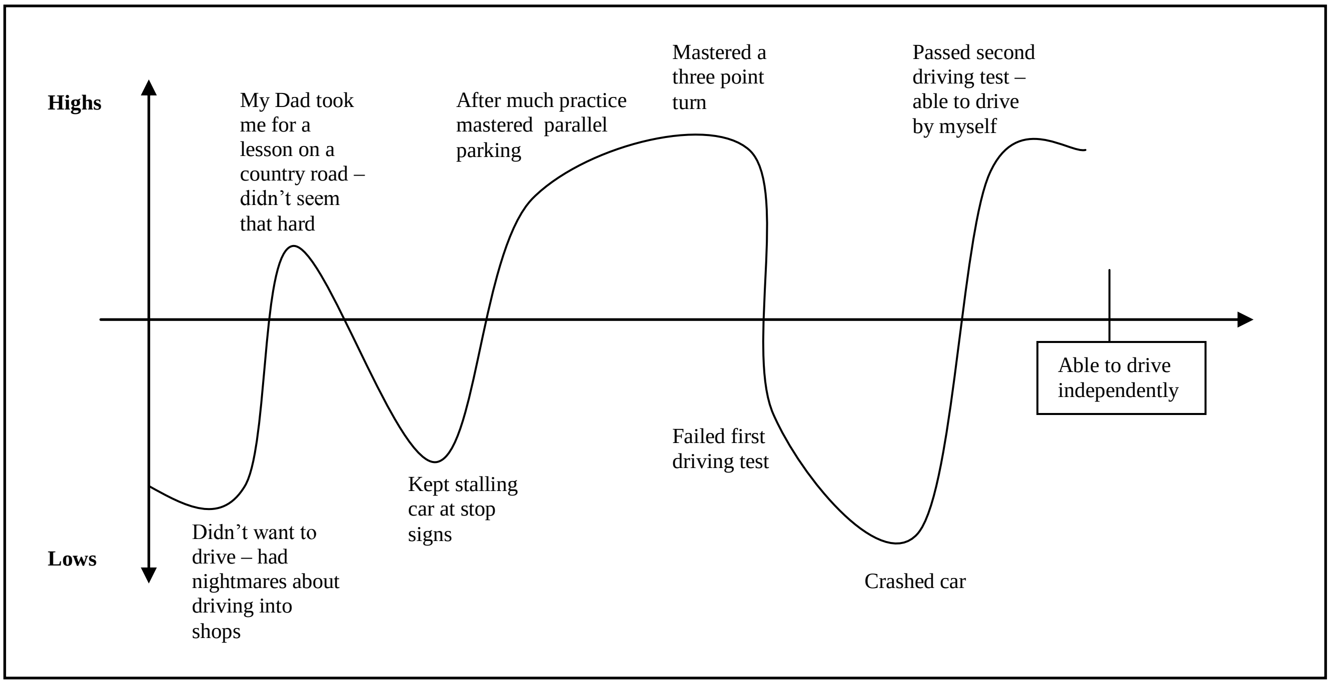
PART C								
	Below you will find a series of statements relating to the quality of your relationships with staff and students within the university. Please indicate how you feel about the following groups by ticking the appropriate column.	Not at all helpful or supportive	Not helpful or supportive	Not very helpful or supportive	A little helpful and supportive	Helpful and supportive	Extremely helpful and supportive	Not Applicable
C1	Select the box that you believe best represents the quality of your relationship with ***other students***							
C2	Select the box that you believe best represents the quality of your relationship with ***faculty members (lecturers and tutors)***							
C3	Select the box that you believe best represents the quality of your relationship with ***administration personnel and offices***							

PART D							
Below you will find a series of statements relating to how confident you feel about completing each task. Please indicate your level of confidence with each statement by ticking the appropriate column **How confident are you in your ability to:**		Not at all Confident	Not Confident	Not very confident	A little confident	Confident	Extremely Confident
D1	Complete a significant project						
D2	Brainstorm areas in the literature to read about						
D3	Develop a logical rationale for your particular research idea						
D4	Be flexible in developing alternate research strategies						
D5	Organise collected data for analysis						
D6	Discuss research ideas with peers						
D7	Generate researchable questions						
D8	Interpret and understand statistical printouts						

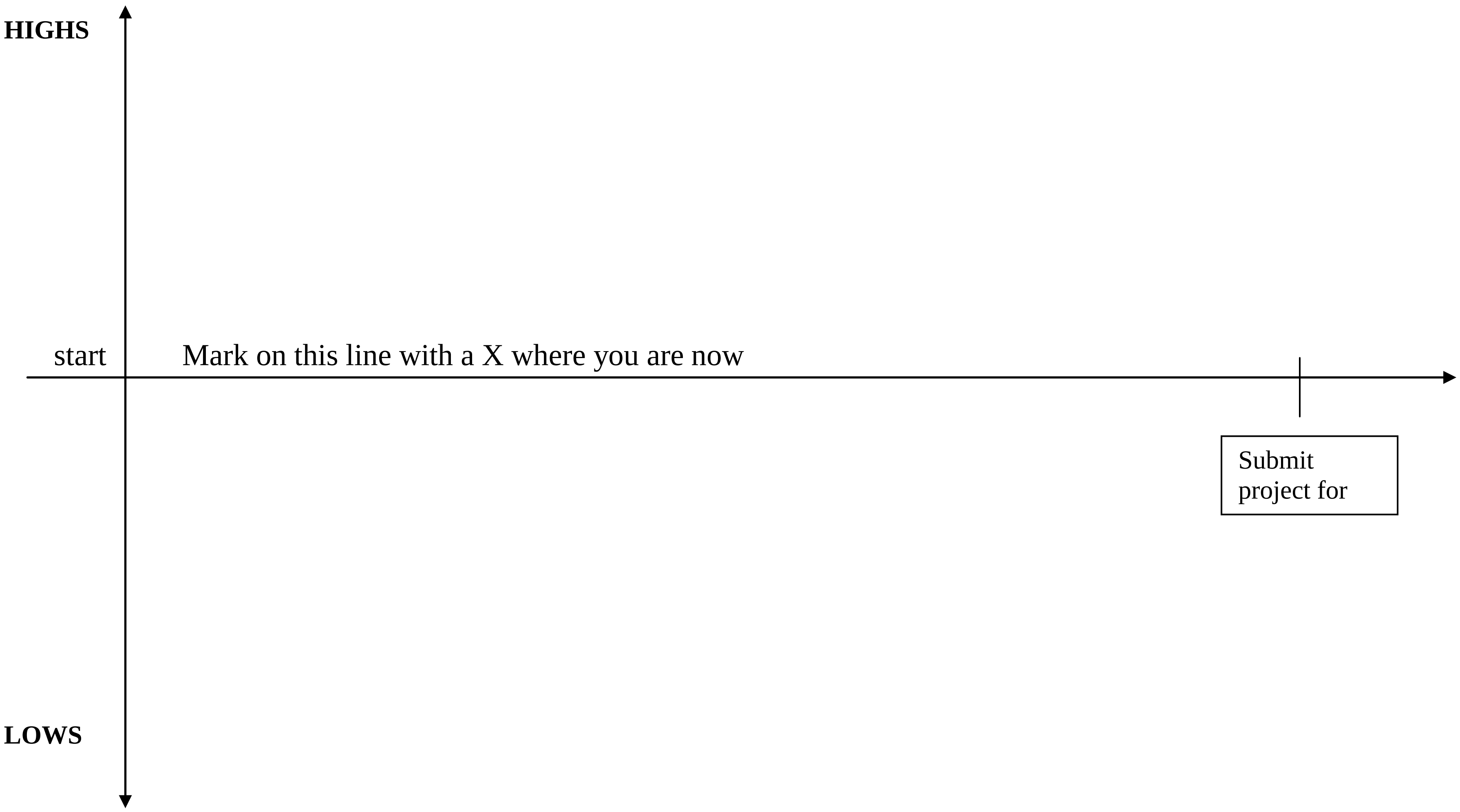
.

		Not at all Confident	Not Confident	Not very confident	A little confident	Confident	Extremely Confident
D9	Follow ethical principles of research						
D10	Consult senior researchers for ideas						
D11	Organise your proposed research ideas in writing						
D12	Synthesise results with regard to current literature						
D13	Choose appropriate data analysis techniques						
D14	Decide when to quit generating ideas based on your literature review						
D15	Utilise criticism from reviews of your idea						
D16	Identify and report limitations of study						
D17	Obtain approval to pursue your research						
D18	Identify areas of needed research, based on reading the literature						
D19	Choose an appropriate research design						
D20	Identify implications for future research						

Your research journey: Over the page please draw the actual and anticipated highs and lows of your research journey (eg related to skills, content, types of activity etc)
Below is an example of how one might relate the highs and lows experienced when learning to drive a car.



Draw on the graph provided below, the actual and anticipated or projected highs and lows of your research project from the start to the point of submitting your project for examination. Label the high and low points



Please add any comments, for example, describe any additional feelings you have about your experience of fourth year, your research project or whether you will go on to postgraduate research studies in the future:

Thank you for completing this questionnaire.
Your participation has been much appreciated.

Please return the questionnaire in the box provided, or to:
Kylie Shaw, International House, University of Newcastle, 2308

12.7 *Appendix 6: Scales with Items and Factor Loadings*

12.7.1 Motivation Scales

Scale	*Item*	*Factor loading (using PCA Extraction Method)*	*Scale Reliability (Cronbach's Alpha)*
Intrinsic Motivation	M1: Understanding this course is important to me	0.749	
	M6: I think what I am learning in this course is useful for me to know	0.848	
	M12: I like what I am learning in this course	0.831	
	M20: I prefer work that is challenging so I can learn new things	0.575	0.748
Self Regulation	M2: When work is hard I give up or study only the easy parts	0.650	
	M7: Before I begin studying I think about the things I will need to do to learn	0.677	
	M14: Even when study is dull and uninteresting, I keep working until I finish	0.608	
	M21: When I am reading I stop once in a while and go over what I have read	0.739	
	M24: I have effective time management skills	0.521	0.653
Cognitive Strategy Use	M3: It is hard for me to decide what the main ideas are in what I read	0.402	
	M8: When I study I put important ideas into my own words	0.705	
	M17: When I am studying a topic, I try to make everything fit together	0.808	
	M22: When reading I try to connect the things I am reading about with what I already know	0.747	0.568

12.7.2 Research Environment Scales

Scale	*Item*	*Factor loading (using PCA Extraction Method)*	*Scale Reliability (Cronbach's Alpha)*
Learning Community	M4: I feel I belong to the faculty community	0.773	
	M9: I feel I belong to the university community	0.784	
	M11: I am able to explore academic interests with students and staff	0.709	
	M15: I experience feelings of isolation when carrying out research	0.392	
	M18: I have a close network of fellow students	0.469	
	M23: I can talk to lecturers about problems I am experiencing	0.699	0.717
Research Support	M5: I have access to adequate library resources	0.593	
	M10: I belong to student associations on campus	0.827	
	M13: I am able to use electronic journals, databases and search engines effectively	0.552	
	M16: I have access to study areas within the School	0.557	
	M19: I have access to interlibrary services	0.376	0.535

12.7.3 Research Self Efficacy Scales

Scale	*Item*	*Factor loading (using PCA Extraction Method)*	*Scale Reliability (Cronbach's Alpha)*
Conceptualisation	RSE2: Brainstorm areas in the literature to read about	0.669	
	RSE6: Discuss research ideas with peers	0.715	
	RSE10: Consult senior researchers for ideas	0.770	
	RSE14: Decide when to quit generating ideas based on your literature review	0.793	
	RSE18: Identify areas of needed research, based on reading the literature	0.843	0.817
Early Tasks	RSE3: Develop a logical rationale for your particular research idea	0.743	
	RSE7: Generate researchable questions	0.776	
	RSE9: Follow ethical principles of research	0.687	
	RSE15: Utilise criticism from reviews of your idea	0.826	
	RSE19: Choose an appropriate research design	0.851	0.835
Implementation	RSE4: Be flexible in developing alternate research strategies	0.781	
	RSE5: Organise collected data for analysis	0.803	
	RSE11: Organise your proposed research ideas in writing	0.795	
	RSE13: Choose appropriate data analysis techniques	0.826	
	RSE17: Obtain approval to pursue your research	0.809	0.862
Presenting the Results	RSE1: Complete a significant project	0.767	
	RSE8: Interpret and understand statistical printouts	0.697	
	RSE12: Synthesise results with regard to current literature	0.853	
	RSE16: Identify and report limitations of study	0.855	
	RSE20: Identify implications for future research	0.868	0.861

12.8 Appendix 7: Journey Plot Coding Procedure

Respondents were asked to draw, on the graph provided in the Student Questionnaire (see Appendix 6), the actual and projected highs and lows of their research project from the start to the point of submitting their project for examination. They were then asked to label the high and low points. The procedure for recording and analysing the information from the Journey Plot is outlined below.

Step 1

Information was collated from each of the Journey Plots using a **Coding Form**, which recorded the following information: candidate number, number of positive and number of negative peaks, whether respondents had marked the position of X on the gridline to indicate where they were at in their journey, the start and end coordinates of the journey. Text was recorded indicating the events along the journey, associated with each high and low.

In addition the area under the curve of the high or low of each was calculated by using the **Grid Transparency** which was laid over and aligned with each journey plot. The numbers of squares for each peak were counted, delineated by the x-axis. Peaks above the x-axis were recorded as a positive number, whereas peaks below the x-axis were recorded as a negative number.

Step 2

Once recorded on the **Coding Form**, the statistical information was then entered into SPSS. This included: number of positive episodes (highs), number of negative episodes (lows), position of the X, start x-coordinate, start y-coordinate, end x-coordinate, end y-coordinate, the x and y coordinates of the highs and/or lows recorded for each respondent, and the area under the curve of the highs and/or lows.

Step 3

Text from the labels from the plot, recorded on the Coding Form, was then transcribed and entered into word processing software for coding. Once the text had been coded using qualitative processes, and entered alongside points on the plot and areas recorded in SPSS, journeys were analysed through parameters of the journey plot listed below to make comparisons between the research experiences for different students.

12.9 Appendix 8: Coding Form and Grid

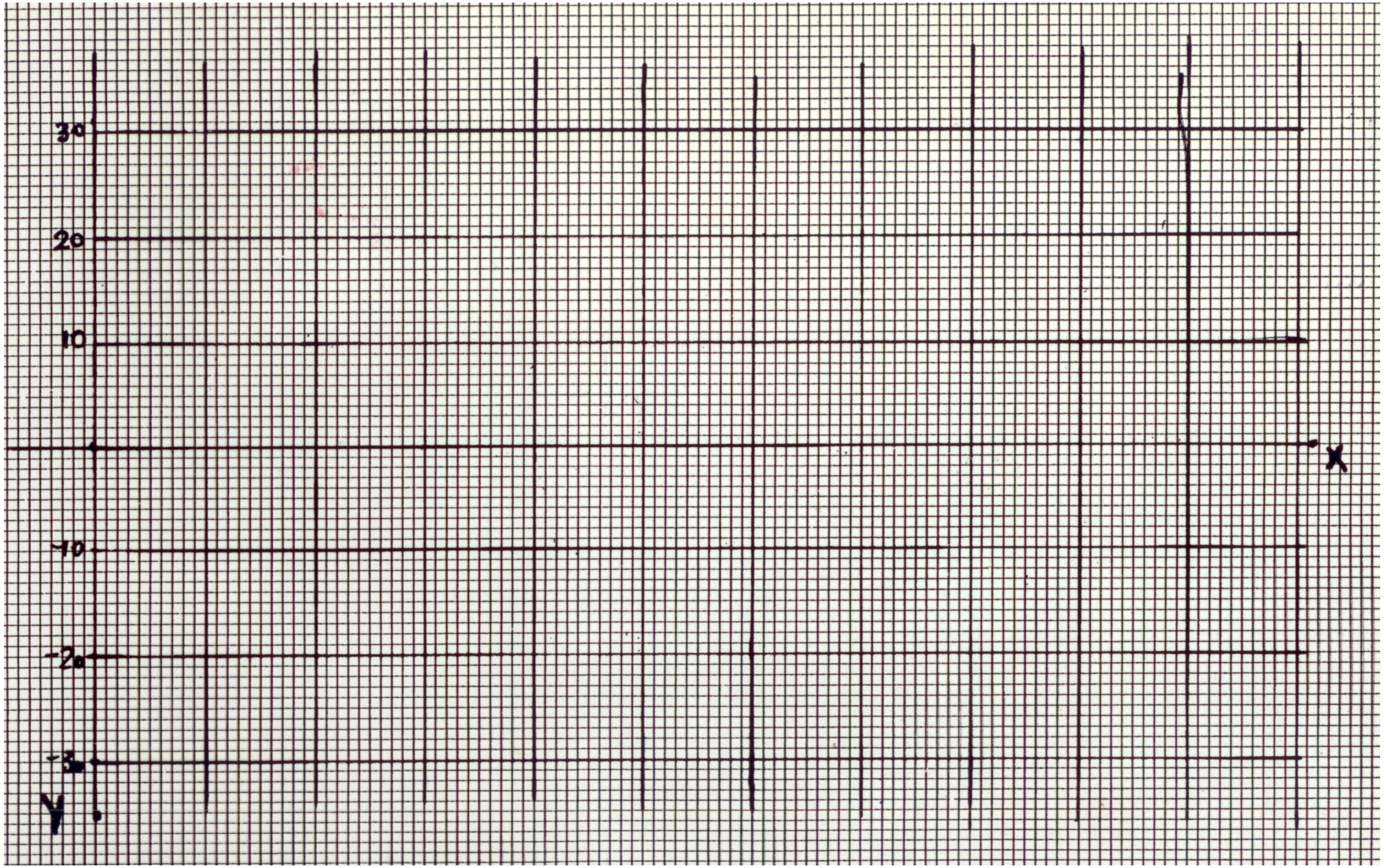
1. **Candidate Number:** ___________________

2. **Number of peaks :** _____________________ **positive**
   _____________________ **negative**

3. **Position of X on the gridline:** ____________ **or** ☐ Not there

	Highs and lows	Coordinate (x & y axis)	Label situation	Comments	Area
Start					
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
End					

GRID TRANSPARENCY



12.10 Appendix 9: Correlation with all Scales and 'Frequency of Contact with Supervisor' for End-on Honours

Scales	**Frequency of Contact with Supervisor (Pearson Correlation)**	**Significance (2-tailed)**
Intrinsic Motivation	0.31*	0.21*
Self Regulation	0.27	0.85
Cognitive Strategy Use	0.67	0.63
Learning Community	0.80	0.57
Research Support	0.11	0.44
RSE Conceptualisation	0.19	1.18
RSE Implementation	0.14	0.32
RSE Early Tasks	0.70	0.62
RSE Presenting Results	0.12	0.37

*****Correlation significant at the 0.05 level (2-tailed)

12.11 Appendix 10: Correlation with all Scales and 'Research Involves group' for End-on Honours

Scales	**Research Involving Group (Pearson Correlation)**	**Significance (2-tailed)**
Intrinsic Motivation	0.11	0.96
Self Regulation	0.35**	0.01**
Cognitive Strategy Use	0.21	0.13
Learning Community	0.16	0.24
Research Support	0.20	0.15
RSE Conceptualisation	0.19	0.17
RSE Implementation	0.23	0.09
RSE Early Tasks	0.27*	0.05*
RSE Presenting Results	0.32*	0.02*

** Correlation significant at the 0.01 level (2-tailed)
*****Correlation significant at the 0.05 level (2-tailed)

12.12 Appendix 11: Correlation with all Scales and 'Contact with Profession' for Teacher Research project

Scales	Contact with profession (Pearson Correlation)	Significance (2-tailed)
Intrinsic Motivation	0.05	0.50
Self Regulation	0.02	0.79
Cognitive Strategy Use	0.02	0.84
Learning Community	0.19*	0.02*
Research Support	0.12	0.15
RSE Conceptualisation	0.14	0.09
RSE Implementation	0.19*	0.02*
RSE Early Tasks	0.16*	0.03*
RSE Presenting Results	0.11	0.18

*****Correlation significant at the 0.05 level (2-tailed)

12.13 Appendix 12: Correlation with all Scales and 'Intention to Continue' for Teacher Research project

Scales	**Intention to Continue (Pearson Correlation)**	**Significance (2-tailed)**
Intrinsic Motivation	0.10	0.19
Self Regulation	0.10	0.21
Cognitive Strategy Use	0.08	0.29
Learning Community	0.14	0.09
Research Support	0.06	0.45
RSE Conceptualisation	0.24**	0.001**
RSE Implementation	0.20**	0.009**
RSE Early Tasks	0.24**	0.003**
RSE Presenting Results	0.26**	0.001**

** Correlation significant at the 0.01 level (2-tailed)
*****Correlation significant at the 0.05 level (2-tailed)

12.14 Appendix 13: Sample Transcripts

A selection of interview transcripts has been chosen illustrating the different types of fourth-year programs to provide a snapshot of the data and the integrity of the interviewing process. Transcripts are provided for programs in the general areas of Business, Engineering and Science. All direct identifying material is removed and this is indicated through either the use of an ellipse, and/or the use of square brackets. If the informant is talking about the subject area the name is replaced with 'My area'.

12.14.1 Sample Transcript 1: Business-based discipline

I How is Honours structured in your School?

P We have got two degrees at Honours level. One is the Bachelor of … one is the Bachelor of ... They are both fourth year separate programs, an additional year on top of the pass degrees and they both have a similar structure in that they have 80 CP, half of which is thesis and half of which is course work. At the moment the coursework is not actually four 10 CP, it is actually three units which together add up to 40 CP, so they do those 3 units of coursework which make up half of their degree and then they do a thesis of about 20 000 words, research. And those two degrees run across, I think, in total five disciplines so in that they are slightly complicated.

I Are the coursework programs research training oriented?

P One of them is a Faculty wide research methods course. The other two are usually theory courses in the discipline in which they are doing their degree.

I And is there any other type of informal research training that the School provides?

P Well, certainly, the supervisor advises the students and helps to design the projects that they do, so the rest of it is mostly through their supervisor. Informally and regularly I guess we bring the students together to talk about any common problems they might have in doing their thesis and so forth but it is really the research methods course and the supervisor that advise them.

I Do you have seminars with post grad students?

P We do, but we rarely get the Honours students to get here which is partly I suspect a combination of poor communication from our end and partly that unless the topic is right on their thesis topic they don't feel compelled to come along.

I What is your role in relation to Honours in the School?

P At present I am the Head of School. The School has an Honours Coordinator who does a lot of the day to day communication and keeping in contact with students and so forth, but ultimately in the Head of School role I sign off on all results, I am part of any review of the programs, I sign off on the student applications about whether they are successful or not. The Head of School has the formal responsibility for all aspects of the program although I try to delegate that as much as possible.

I Do you supervise any Honours students?

P I did one last year, and a part time student who started last year and will finish this year, so unless there is something unusual happening there is at least one or two students that I supervise.

I What proportion of Honours students in your School continue onto RHD?

P Very small at the moment our RHD program is. I think we had a thesis which was submitted for the 2005 year, and again in the large number of past students that is a very small proportion. In each Discipline it varies from one or two, or three or four, but rarely more than that at the moment.

I Is that because an Honours Degree is not valued as much by the professional community?

P Really hard to know. I think it does trend, well, observations in the past is that enrolment trends fluctuate with business cycles. So the easier it is to get jobs out there, the less likely it is for people to do Honours. And certainly in the ... area, while some employers value them deeply, and there are some jobs are really hard to get without an Honours degree, the bulk of the entry level ... career type jobs don't require an Honours degree so, it is often difficult to persuade people to do that extra year when they can get a job a lot easier.

I Do you have any international students doing the Honours program?

P No, very few. Both last year and in previous years they are nearly always local students.

I And what is the primary reason for offering Honours?

P I guess we see this as an absolutely essential part of our portfolio of programs. I guess we would argue certainly to students and amongst ourselves that it is not only training towards research higher degree students and for a small proportion, tiny proportion of students who are interested in an academic career, but that it does give students an extra intellectual challenge beyond the pass degree. That for those who are interested in concepts and research it is a much more rewarding program than the undergraduate program. And I guess we would argue to the students themselves as well that it does set them apart from pass students and it does provide them with training and skills and experience that they don't get at the undergraduate level. So there is a variety of reasons as to why we do it, but we certainly see it as really important and I would fight to the death to make sure that it is retained no matter what went on.

I And in the School do you need a first class Honours to actually go straight into a PhD program? How does it work?

P You need first class Honours usually to get a scholarship, certainly a competitive scholarship, but we often enrol people who have got a 2/1 to do the PhD but they either do it without a scholarship and support themselves perhaps through casual teaching or by other means or on other occasions, and unfortunately it is rare in our Faculty, if somebody has won a large grant that includes a PhD scholarship while we would prefer a first class Honours graduates to take that scholarship, because it is not a competitive process there is chance that you want people to take that scholarship provided under that grant. So the 2/1s can do it, the necessity for firsts is really about funding.

I And in your estimation what are the key outcomes of Honours for the students?

P I think from what I have perceived of the students themselves, and my very historical personal view of Honours, is that you actually learn more about the Discipline through Honours than you do in the other three years put together. And that is partly because of the intensive nature of the coursework, they are in very small groups working very closely with staff. I think the Honours students are often shocked by the amount of work there is to do in an Honours program, despite the fact that they do three piddly little courses over the year and one project albeit a bit longer than what they are used to. So they do work really hard.

I think the intellectual challenge of it. They all end up feeling much more confident about their grasp of their Discipline after they have finished so I think they come out of the year with knowledge and understanding which is way beyond what they have started the year with, in that capacity in terms of generic skills to do very complex essays and a research thesis within a pretty strict deadline which again is a feature of Honours, is also a more generic skill that they learn.

And I think their research skills, in particular, that they develop means that they are on the start of being people who can run a very rigorous research project, they know how to design it and how to carry it out. While in academic terms that is only the beginning of the process they are certainly gaining research skills and understandings well beyond the pass students as well. So I think there is a lot of generic skills that they learn, as well as the specifics of their discipline and research skills.

I Do you have any particular stories or incident which best describe how students skills develop during their Honours year?

P Certainly in past years I have taught both the research methods course, which is always the first semester of a full time program, and then sometimes a theory course in second semester or I have been supervising my own students and one of the things that I think we are starting to do quite well is the research methodology training. I have been quite impressed over the last three or four years with the students that I have watched who have started the research methods course without really understanding it very well, and I guess my Discipline, Industrial Relations and Human Resource Management, is one where they don't get a lot of training in research methods and so forth in their pass degree, so they are almost starting from scratch when they do Honours. When they end up writing the research methodology chapter of their thesis, they say things and understand things that they would never have understood at the beginning of that course. And I have had both internal and external examiners who have commented that they have, even in theses with less than strong empirical results, about how good they thought the methodology chapter was. So I think we are starting to get much better at training our students in research methods and that is something that is fun to watch.

I guess another little example is that I taught the theory course last year 2005 in the Human Resources side of the program and what we try to do is give the students a feel for the origins of the Discipline, so we look at the different writers who have written and become seminal writers within the field, and followed that through historically. And I really enjoyed watching, there is only three or four students doing it, really buckling down and doing regular weekly readings and coming along and talking about very sophisticated ideas in a very small class where they can't hide, and just watching their understanding and all of a sudden half way through a semester they start asking questions and you realise that they are starting to get the hang of this. That's a lot of fun and it does mean a lot because the program is ultimately a much more conceptual one. You can't do it a/ unless you've done well in your first degree and b/ if you are interested in ideas. And I am always impressed by people's capacity to grasp ideas and that's something that is nice for me because that is the sort of intellectual part of academic work rather than all that other stuff that happens at pass levels.

So, there are both research methods and theory things that make the Honours students a joy to teach, and what we have found in recent years, at least in my Discipline, is that there is sort of three or four people that do it each year, and they have nearly all got 2/1s in the last little while, which is a bit disappointing because we would like to get more first class graduates, but they have just been really good solid students who have grown in the program, who haven't been outstanding but who give you a sense that you are giving them a good strong training, and even if they are not potential noble laureates, they are really getting the hang of it and that is quite satisfying I think.

Certainly I observe in other Schools in this university and in other universities a high proportion of first class Honours students. And I find it very hard to believe that the quality of the students themselves is all that much greater, so I fear sometimes that maybe our standards are a bit high. Because I am certainly satisfied with the knowledge and the skills that our students have by the end of their Honours year and I worry a bit that we might be being a bit tough on them. Ultimately it is often nice to have those firsts who have a little bit of extra spark and a little bit of, a bit more brilliance and are therefore, I think that my experience is, that those that have got firsts kick on a bit better into their PhDs than the 2/1s, but it certainly doesn't mean that the 2/1s can't finish just the same.

I How typical is it for research students to be employed on research grants?

P Very untypical unfortunately because our Faculty do not win many research grants. That's a bit of a drama and also I think there is a bit of a difficulty. I don't think Business related disciplines and possibly even in the social sciences more generally, I don't think we are very good at putting PhD scholarships into grant applications, there is a real art I think with having a PhD scholarship and a PhD project within a grant application which is separate enough to stand alone as a thesis topic but is still part of the broader project that is getting funded. And I don't know if that is something which is especially difficult in those sorts of disciplines in terms of grant writing and so forth and inherently easier in the hard sciences for example, or if it is just something that we don't, haven't learnt to do very well as yet.

But unfortunately I think it is always better for a student to be funded through a larger research project because it means that the supervisors have got expertise and deep commitment to the substance of the project, and provides a better framework for the students to move. But no, it is relatively unusual and often we find students are doing topics that we find they themselves have chosen, and the task is really to find a supervisor who is capable of doing it, rather than starting with a supervisor who has got a project and then getting the student who is interested in doing that project that the supervisor really came up with. And I think again that's a clear line between the engineering and hard sciences and a lot of social sciences and arts, where the topic seems to come from the student and not the supervisor.

I That is the end of the questions. Do you have anything you would like to add?

P Well, I think that one thing that you find in our sorts of Faculties is that there is a very strong difference in those disciplines where students and supervisors who use largely quantitative methods, and those who use qualitative, and in that sense the sort of skills and training that the students are getting can vary quite significantly. We try to overcome that a little bit in that the research methods course that we give our students anyway is the same so that they are all doing it, which produces interesting issues. I mean the course that we do has people from accounting which remarkably has actually got quite a lot of qualitative research in it. Finance which is about as quantitative as you can get. Marketing which is often very strongly quantitative. My field of IRHR has got a lot of qualitative in it, so it is sort of all over the place and it is often a bit of a challenge to teach such a diverse group in research methods but we do try to give them a taste of both.

What we also find is I think that some of the disciplines, partly because of the nature of some of their research methodologies, themselves give pass students more or less training in research methods, so Marketing for example has got quite a lot of quantitative research methods in it because market research is a significant part of the profession. The Industrial Relations and Human Resource management people that I am most frequently with, we get very little research methodology training until Honours and it means that a lot of our pass students don't come up against that at all, so in that sense we have also got a bit of a challenge when it comes to the Honours students in that when you have got the Marketing and the IRHR Honours research methods course they are coming from quite different levels of experience and understanding in the past. So again, that's a little bit of a challenge.

I guess that what you also find that then parallels all of that is that the different disciplines are more or less sophisticated in their research methodologies in a way. Certainly my area has got a long history of it not confronting methodological issues very well, where as especially in the quantitative areas they almost invariably do all there, albeit from a very narrow base. So the Honours students quickly learn those sort of things and you get a lot of students who abhor the other side of the fence. Some who are very bright and want to do research but don't want to go within a thousand miles of numbers, and people who are super quantitative and don't accept almost the legitimacy of qualitative research and I think one of the training issues is to at least get an acceptance amongst the students of a pluralism when it comes to research methods, so even if you mostly use quantitative methods you have some knowledge of qualitative and some sympathy and understanding that quant and qual simply do much the same thing but with very different strengths and weaknesses. That has certainly been a theme of the research methods course when I have tried to teach it, it is not so much saying that one is better than the other, but rather that they are good and bad at different things. I am not sure how effectively students have ended up accepting that, but it is key ups there from my point of view, that hopefully will flow through to their knowledge later on. Whether those issues are relevant to your project I am not sure.

I Yes, they are. And it is interesting because even within the School each discipline has a very different culture it seems.

P It does indeed, and the more aggregated the Schools become, the more that's the case. At the same time our ... Honours students, and I think they generally have larger number than we do, don't do the same research methods course which I think is a bit of a pity, but maybe that reflects the particular orientation of the particular ... Department here. Yeah, so that is some of the issues, I think, but generally speaking I think we give our students a very basic training in research methods, I think some of them especially in the quantitative area end up wanting deeper, narrower research training when they get into a PhD because they're applying techniques that haven't been covered in the base level in all this, and while their supervisors may be familiar with them and expert in them it is hard to get a systematic training, so ultimately when it gets to the PhD we get far more requests for additional courses in quantitative than we do in qualitative. Whether that is reflective of something else or not, I am not sure.

12.14.2 Sample Transcript 2: Engineering-based discipline

I If you can start by letting me know how fourth year is structured in your discipline, in relation to the research project?

P In the fourth year, 50 units is coursework and the other 30 units is a project. It is set up so it is a two semester thing, but because of the 10 unit grouping we say that they do 10 units in the first semester, and 20 units in the second semester.

I Do all of the fourth year students do the research component?

P Yes. It is a funny sort of thing in that our accrediting body says you shall do a project, and quite possibly our accrediting body is more interested in it as an engineering type project as opposed to a research project. So some of the students do more of an engineering type project, but they are still doing similar research type things. They are doing background searches, defining their goals, etc. Carrying out a project to the end, and probably the better students we try and also make them dig a little bit deeper, do something at a higher level. That is probably the way to say it.

I So they work with industry partners?

P They can do, so we have different ways of generating the project. Academics generate projects in line with our research areas usually, we get industry people saying we would like a project run in this area, so that is another mechanism, and we can also get students say look I want to do this sort of project. So there are three ways they can be generated.

I To get Honours for their degree it is generated on the grade point average?

P Yes, based on WAM which is basically another version of grade point average.

I Is there any research training within that 30 credit points? Do they take any courses?

P There is a lecture series that goes along with that project. So perhaps once a fortnight they will have a lecture on a topic, it might be things like referencing, using the library, preparing a presentation, writing up a report, those sort of things. So they do that as part of their project. The other thing they would do, is that they would do a third year compulsory course, which is Introduction to Engineering Design, and again that is designed to take them in a nice way through the things that they might have to do to complete a project or a research project.

I What is your role in relation to fourth year?

P I am the Program Convenor, so I get the whole package if you like. In terms of fourth year, we do have two other academics nominally assigned to organising the projects, one for the local projects and another for our

Singapore based projects. I as part of the discipline, or the discipline as a whole, looks over the assessment and the standards and those sorts of things.

I So would students be assigned to supervisors or advisors?

P Yes, so each students would get nominally an academic supervisor. If they are doing an industry project they will also get an industry supervisor. For the students who are in Singapore, because we are stuck here and they are over there, they will have an academic supervisor and a local supervisor appointed. In that case we try to advise their local supervisor, as opposed to advising the student.

I On average how many students would a supervisor have?

P There is a good question! Too many. At the moment, I have got probably about 9 students. Six local and three in Singapore. It will depend, but that would be about the average, middle of the range.

I Do you supervise students as groups, or do you see them all individually?

P Individual. We do run group projects, originally that was our method in Singapore because there are a lot more students there than what we have got here. Probably the problem that we have in that case is determining who has done what at the end of the day, so we prefer single projects.

I What are the student numbers for this year?

P Locally we have about 60 projects, that is across three disciplines of Engineering. In Singapore in a year you get two cohorts of students, in probably similar numbers, so 2 times 60 in Singapore.

I Is there any way that you identify students who do well, who perhaps you want to go on to higher research degrees?

P Usually the supervisor as a part of the process would pick up when they have got a good student. Often we have picked up the good students by then, in that by the end of third year you have seen the students and you know what they are capable of and the good students you are trying to direct into a project that will extend them and allow them to get the highest grades and then qualify for research scholarships and what not. That is the mechanism.

I Do you allocate the projects at the end of third year, or the start of fourth year?

P The start of fourth year. We will generate a list of projects at the end of the year. For Callaghan students that list is made available to the students in the summer break, and late in the summer break they will be asked to nominate what they want to do. So they can get an idea of what they are looking at before they start. Often they are sending you emails saying what is that project really about, can I do it, am I capable, those sorts of questions.

I What proportion of fourth year students continue on to a research higher degree?

P Not many. Probably one or two in any given year. One or two students. The main issue is they can make so much more money if they go out and be Engineers. So it is really the guy, or the person, who is really focused on doing research that stays on.

I Has this changed over time?

P I suspect it has always been like that. You might get peaks in students who are willing to stay around during recessions and things like that. I have had another academic say ‘Bring on the next recession’ for that reason. I probably haven’t been here long enough to have seen that, the demand has been so high for the last couple of years.

I Would you get students coming back after a time, or coming from different institutions?

P Most of our postgrads probably come from within our institution. We do, because we have a reputation for ... in our Discipline, that area seems to attract a few international postgrads, but most of the ones that have gone through are the ones who stay around. Once they go and get a real job it is kind of hard to persuade them to come back.

I What is the primary reason for offering the research project?

P I am leaning toward saying either our accrediting body requires it, which of course is a key reason, the other key reason is that we try to get students to go into research which is the other reason. SO there are two reasons, but probably more that the accrediting body requires it.

I Does your industry like the students to have those skills?

P I think it is quite often in an interview, when they are trying to find out about a student they know that they have done a project, so a common question is what was your project about in fourth year? What sort of things have you achieved? Can we look at your report? I think they are common questions for our graduates, so I think there is a focus on that.

I And what type of skills do you think they get out of that?

P Hopefully I guess they get to work out what is required to achieve a goal, because they need to work essentially independently, they have got to set themselves up, define what they are going to do, organise their time over the two semesters so they can get the job done, do some background research in terms of finding out more information because there is always an element of learning in the project. Then they have got to build steps to get things to happen, so they have got to interact with our laboratory staff, order parts, test circuits etc. So it is really the whole range of project management skills and research skills too. They get to see all types of operations in many respects.

I Do you think that project actually prepares them to go into a PhD? How prepared do you think they are if they do go on?

P I think it is a good stepping stone. Certainly anyone who has done well in the project, really is set up to do the same steps in a lot more detail with perhaps a greater technical difficulty, but the skills transfer quite well.

I If you saw a student in fourth year, and you thought "wow, they would make a great PhD student", what would you see?

P I would see a very complete project, or what I would say is a complete project, the student would have thought about all aspects of what he had to do, rather than just focus on a particular plan. He has hopefully come up with some novel ways to achieve results, rather than just stumbling through the first way that seems to do the job, so those are the sorts of things I think that I would be looking for, and that I would see in the better projects.

I Do you have any particular stories or incidents which best describe how students skills develop during their project?

P Sometimes you get students that really surprise you in that for whatever reason they come at the end of third year, and you look at their WAM, because you always try to get a bit of an idea at what you have got yourself in for, and you will go, OK, it is in the middle of the range or towards the bottom end and they can really blossom in that they can finally do something that means something to them or fits with their interest. So you will get the odd students like that you pulls out a sensational project, from nowhere. I guess I have got one student like that this year, whose thing really seems to be ... Now he was probably a slightly above average student in terms of WAM, but I suspect he will get one of the better results this year in that he just loves to tinker and build things and he has assembled this great big mass of hardware, which all works, essentially because he just loves to experiment and try things out. So it has suited him.

I That is interesting because in his field there is a wide range of areas you can go into.

P Yes. The sort of coursework the students do, some of our courses can be very mathematical, and you can often struggle to see where that can be applied anywhere other than in a research field. The project however can be a very practical focused thing, so students sometimes get into there and go 'wow, this is great! This is what I have wanted to do all along and I don't have that boring lecturer annoying me each week!"

I So can they hand in something practical as well as a word limit based report?

P Yes, what they do is they will write their report or their thesis, but they will also have to do a demonstration, so physically. We have two days where they all set up down in the lab. In the morning the academics all wander around and assess their demonstration, and in the afternoon it is open to the public so anyone can come along and have a look and see what they have done. It is part of the requirement that they demonstrate whatever they have done.

I How typical is it for project students to be employed on research grants?

P I guess we try to keep what they do on their project as separate. So it is just project. There have been cases where students will do a summer scholarship, which will be on money from a research grant. Then they might go and do a project based in what they have been working on. I don't know if you have heard about our ... team. There is a bit of money associated with them, so often the guys who organise that search out the students who they think might be good, they give them a summer scholarship, and they work over the summer break between third and fourth year, and then they will come back and find a project in that particular area. There is probably instances when guys have done a project, with a particular supervisor, and got to a point when the supervisor has said 'hey, do you want to do six months more work, because you have learnt all of this stuff, do you want to do something useful for me?' and they are paid that way. Presumably they can't twist their arm to do a PhD or something like that. While the actual project is going on I think very few students get paid unless they are doing something industry related.

One instance I know of, I have got a student this year who is doing something specifically where someone from industry wanted to achieve an outcome, and to get a good student, or one who we were confident would get a result, we offered them 8 hours a week pay. So basically the applied part of the project, where the student was actually ..., creating prototypes, employer's paid her to do that. It was a very specific case, a guy is developing a ... which he wants to market into China and he wants a ... He has got a deadline where he needs to have something that works in a month's time, so at the start of the year I said well there are good students, we could easily do it, but you will probably need to pay them because they have got to commit extra time.

I Have you got anything else that I haven't asked that you would like to add?

P No.

12.14.3 Sample Transcript 3: Science-based discipline

I Can you start just by letting me know how Honours is structured in your School?

P So the Honours program in … is structured in two parts. The first part is the coursework, lecture and tutorial program and the second part is the research project. So in the coursework program they have a number of core subjects, and at the moment we are offering two different Honours. So there is basically a BSc … Honours, then there is a BSC … Honours, so it is a specialisation in ... So if you are doing the … Honours there are four Core subjects, and if you are doing the straight BSc … there are three Core. Then on top of that if you are doing the … there is six electives that you choose out of a pool of 14 subjects, and for the other one, the BSc there is seven subjects.

When I say a subject it is not like an undergraduate subject in terms of commitment the elective subjects are 10 hours face-to-face lecture with the associated out of class component. Some of these subjects have exams, and some don't, some are continually assessed with a weekly assignment and a major assignment, some have a weekly assignment plus a final exam, it just depends on the nature of the subject being offered. All of these subjects are obviously geared towards preparing a student for a research higher degree, so the Honours program is really a stepping stone if you like through to the research higher degree. Although we do have students come in, just doing the Honours program, and then not continuing on for whatever reason. Teachers even, we had a guy from Maitland who came in and did an Honours program and then he just went back to teaching and that is as far as he wanted to go. He just felt it would help his professional development in the subject area, so he just did the Honours program.

So in Science, the Honours program follows the Scottish education system which nobody else in the world seems to follow (laugh). In particular the US and England and so on, they have the 3, 2, 3 system, so 3 for an undergraduate, 2 for a Masters, and 3 for a PhD. Here we've claimed the Scottish for 3 and then 1 Honours, and depending on the Honours grade you can go to a PhD, or if your Honours grade is not what you would like it to be then you can then enrol in a Masters and then upgrade, so that is what we run here.

I You have talked about the research training in Honours, do you run particular courses in research methodology?

P Not specifically, no. Basically the idea is that with the other part of their time in the Honours program they are doing their research project, and that will be involved. So they will be involved with a supervisor or supervisors, and as part of that process, the training and the research will involve the methodology, and that will be included in the project. But to actually have a course and assess them? There is no formal course in research methodology, no.

I What is the coursework that they do, is it theory based?

P It is both. In [My Area] by the time you get to an advanced level, well a lot of it is … really, so it is a fair bit of theoretical studies however there are a number of ones that are specifically designed for experimental techniques. So I will show you across the hall a little bit later, and you can see some of the equipment there, but here in our discipline we have an experimental research program, and supporting that is a theoretical research program, so we have a number of research courses in experimental techniques, how they work and we take them into the lab, and then their research project then they actually get to do the formal experimental training, you know, the idea of keeping a log book and writing down everything, and making sure you write down where the equipment was and what it was up to if you are constructing something, and all of that sort of stuff. That gets taught to them as part of their research component, and the actually coursework on the experimental side, you get taught the experimental techniques, as opposing the theoretical ones. And then there are theory projects like …

I What would a [Your area] thesis look like? Would it be a 20 000 word written thesis?

P Can I show you this? (gestures to booklets on his table, laughs)

I Sure!

P So this is the four students who have submitted just a few weeks ago and this is the typical type of thesis. So we do say in the program outline that they should try and aim for about 80 pages, and there are a number of reasons for that. When a student becomes involved in a research project there is obviously much more that they can do, and they have only got the one year, and in fact we require that it be handed in on the 30 October, and they are not allowed the start till the 1st February. There are a number of reasons for that. There is a finite amount of time, and the students are coming in, they are motivated, they have to get a credit average in their undergrad to get into Honours, so they are motivated students, and they grab hold of a research project and they want to do this and they want to do that, and you have to contain that.

So we do that by saying this is the limit in time, and this is also the limit in the report, so they basically write up the report and the normal process in to have the abstract, which describes the area and what the motivation is, there is a table of contents as you can see, then the first chapter which is the introduction to the material, why we are doing this research, what area of [My Area] it is in, that sort of thing. Then Chapter 2 is normally a lit review, they look at past work and put their research in context, then Chapter 3 is normally about their methodology and their equipment maybe, maybe some of their data analysis procedures and maths which goes with that. Then there will be a results chapter which goes on top of that for 4, and then there is a discussion and conclusion. So about 80 pages is what we limit it at, including the references and figures.

I So they would start it at the start of the year?

P There are two intakes, because we offer it second semester as well, and we offer it part time as well. Can't start before the 1st February. We offer some summer scholarships to students in the research groups, and quite often the third year students will take those up obviously. So we have had the situation in the past where students are already in here, and enrolled, and managed to get a summer scholarship, would start on their Honours project, and so that is an advantage, that is the problem. So we made this rule that you can't start before February 1. And if a student is working with their supervisor over the summer, and it does happen to be their Honours supervisor, it is my job as the coordinator to go and make sure that there is no overlap, they have to clearly demonstrate that they are different. The other reason is that we have students coming in from other universities as well, and we like to give everybody the same starting line.

I So you do get students from other universities?

P Yes we do. This year we have six Honours students in [My Area], which is above average for us, the normal average has been about four. And I have just had the Honours meeting for next year, with a group of interested third year students, and I had 15 in there. So, there you go, something is happening. I don't know how many of those will convert, but we will see. But it is certainly much more than we have had in previous years that are actually interested from third year. And so out of those six this year, we have got one student who came from another tertiary institution.

I Do you have scholarships in Honours year?

P Well, we do offer them. So when we are offering the research projects, it depends on the research group and how much money they have. And they will say there is an Honours scholarship available and they are normally between $2000-4000. They come from research grants, ARC funding or whatever research funding they have within industry or whatever.

I Is it typical to have students involved in research grants?

P Yes. Oh, actually involved in the grant?

I So the group that has the research grant, offering the scholarship, is that typical?

P In [My Area], yes. The only way we can carry on our research is to have external funding. And, actually it is an interesting question, because when I first came here there was no such thing. That you would have an Honours scholarship, offering money for people to do research at an Honours level, you would get offered the project but there wasn't the culture of talking about money or scholarships. It is in the last six or seven years it has started to come, I guess, one particular person decided that they would try and, what should I say (how will I say this nicely?), get a bit of competition, offer some money,

I An incentive?

P Hmm, so that of course meant that the other research groups then had to compete a little bit so it has gradually grown to the point where most of them now are offering some money, some scholarship money. I think it is good for the student to get some money, at the end of their degree, they tend not to have too much.

I It would be interesting then to have that connection to that research group, do you think that helps the culture of the discipline.

P Yes, it is interesting. We haven't actually sat down at discipline meeting and said, 'well these Honours scholarships, what are we going to do?' it has just sort of developed. As a coordinator I have let it go, you can't go to a researcher and say you can't offer money, and so it is good for the students and it is healthy.

I I am asking all of the Faculties this question, and some don't actually get research grants at all, so that is why it is interesting to see it across the board, but nearly all have said that it would be a positive thing, so it is great that you are doing it.

P Oh, well, not every group is doing it, research funding comes and goes, as you know. So if we do have that research money we like to offer, and generally we do, but there are one or two groups in the department that aren't very well funded within the department so they find it a bit of a struggle. So there is an issue there where you have got a group who is offering money for some Honours student that is wavering, in [My Area] you can see some interesting dynamics, but I think we are all pretty friendly and there is not too much ill will, if one research group has some scholarships and another group doesn't.

I You talked a bit about your role in relation to Honours, but can you talk a little bit more about that.

P I am the coordinator, so I look after all the administrative side to the program. So what does that mean? It means, at the end of the year we get all of the third year students together who are interested, we give them an overview and information session as to what fourth year involves. As part of that I have to get my colleagues to get me their research project summaries, so I can give those to the students, and some years that is a bit of a struggle. So we get all that together, give them a document, which at least is a summary of all the projects that will be offered in the coming year.

After that if anyone wants to do Honours from another institution or from here at Newcastle, there is an enrolment process. So if it is a student from another institution there is obviously questions to be answered about how to enrol, what is involved, and they all come to me. Then all the enrolment forms come through the Faculty, then they come to me to sign off, and I have to make sure that they have a research project, and that the supervisor they have chosen has the capacity. You can’t have six Honours student with one supervisor and so on, and then by the time we get to Feb 1 the students start on their research projects I go round and make sure everyone is happy.

Then when semester starts what we do is we have the coursework a little bit flexible in terms of semesters, so even though the CPS system requires us to put down course codes, the actual content of those is really a little bit flexible. So we get all the students together and we say all right, what subjects would you like to do because they have a choice, then we try and get the students so they weight their coursework a little bit more towards Sem 2, because their research project mostly has to be done in Sem1, so we try and balance their load. So there is a little bit of toing and froing there that I have to do.

Finally we get the timetable cemented down at the latest in the second week of Sem 1, and then hopefully everything goes smoothly. At the end of the Sem, I then have to organise exams for that semester, so we get them in, supervise them and enter the grades. Deal with any special consideration and that sort of thing. Then second semester runs, and I have to organise the examiners for these (gestures to pile of theses). So on the 1st October the student hands in their thesis, and then I have to assign the examiners.

So normally the examiners are done within the department, but I ask each supervisor if they have an external examiner that they would like nominated. If there is then I will email those. Last year we had a guy from University of NSW, and we have had guys from Uni of Sydney, and Uni of Wollongong, and some other guys as examiners, and then you have to organise them to come to the seminar when students give a seminar on their research.

They are happening next week if you would like to come along. The Honours students will be there and they will present their work, half an hour seminar with Powerpoint and everything, and then after that we give them an oral exam on their work.

So for each student we have three people, myself, I read all of their work to keep some sort of balance between them, then we assign two extra examiners, so there are three examiners per student. So the three examiners plus the supervisor are involved in the oral exam process. The three examiners have grading rights, the supervisor doesn’t have any grading rights in the oral exam. So the process is each of the examiners reads the thesis, and they independently come up with an approximate grade, then they come along to the seminar and see how a student presents, and then they have an opportunity to ask the student questions at that seminar in the normal process, and then when they come to the oral they can ask more detailed questions based upon that.

After the student leaves after the oral we decide on the final grade for the research project. The supervisor is on the panel, because the panel might like to ask the supervisor questions such as does the student show initiative, has the student had to be led all the way or pushed, you know the sort of research potential that the student might have, it all goes into the pot and then we come up with a grade. Then after all that, after next week, then there will be the second semester exams, so I organise those, put it all in a spreadsheet, and then send off the final grades. Then after that it doesn't stop. You have got the next year coming, but for this previous year quite a few of them like to have references so I write a few of those for them, for jobs and things.

I What key outcomes do you think the students get from Honours?

P Hard work! They do know how to work.

I Does it make them more employable do you think?

P That is an interesting question, I don't have any hard data on that. Probably have to talk to some of our employers about that. The gentleman I mentioned that was doing the teaching, he felt that he was not necessarily more employable because Science and Maths is so rare in the education system, but he felt he was better equipped to deal with some of the senior school questions that he was getting.

One of the major streams in [My Area] here at Newcastle is the ... program. We have had students go to industries like that without an Honours, and they have been quite employable.

I What is the primary reason for offering Honours?

P The primary reason is a stepping stone to research.

I So you would see the majority of it as research training?

P The discipline sees it that way, yes, the academics in the discipline see it as research training, and they would expect that most of their students would move into a Masters or PhD program.

I Do you see that in the numbers that go on?

P Yes we do. Not necessarily here at Newcastle, so we have quite a few of our students who do their undergraduate here at Newcastle, complete their Honours here, and then pursue their PhDs at other universities. So whether they go to ANU, UQ, UniSA, anywhere, but most of them do after they do an Honours program they will pursue a higher degree somewhere.

I Do you get students from other universities to come here for their PhD?

P Yes we do. Let me see. We have had students from Norway, Sweden, the US, NZ, Uni of NSW, Uni TAS, La Trobe, yes.

I In [Your Area] is it a good thing once you have done an undergraduate somewhere to go somewhere else to do your PhD?

P At some point if you want to pursue a research and academic career you have to go out of your home institution. Normally this is done after the PhD. So if a student does their undergrad at Newcastle, their Honours and their PhD, and at that point does their postdoc overseas somewhere, I think that is viewed in equal light than if someone has done the switch at Honours level. I don't think there is any difference in perception of the students' ability if they have done that.

A part of the reason in [My Area] is because we have a National accreditation process through the ..., and they have a committee who goes around to all the universities in Australia and assesses their undergraduate and postgraduate ... program. So somebody who has done a [My Area] degree here in Newcastle is quite equipped to go anywhere else. Having said that, some of the academics in some of the other universities don't agree, when it comes to enrolling a student we have had a case here where a student got a H I Honours, a top level Honours, and applied to go to another university close by in a larger town, and they were going to require him to redo the Honours and we thought that was rather bizarre and said so, and I understand now the situation has changed and they have become a little bit more reasonable. And that is shown by the fact that our Honours student do go, last year we had one go to UQ campus, one guy went to ANU and another guy went to UniSA or Flinders without any trouble.

I To what extent is Honours valued by your Faculty or School?

P In [My Area] Honours has always been highly valued program for channelling students into research, and [My Area] is very big on research. I have been here 13 years on staff, and there is always a big culture around here at ARC time, it is like don't come near me in February or I will bite you! Everybody is here writing proposals, so with that culture and to feed that research you need students coming through. So it is valued. I hope I am not giving the wrong impression, we are not using the students as grist for the mill in any way, but it is valued in the sense that you have a research program that feeds back into the undergrad program so you are at the forefront of what is going on, and you value the fact that the students get a high value degree of education in [My Area]. A stepping stone to that is the Honours program. Another thing I meant to say is that there have been a number of meetings and strategies to look at increasing the numbers in Honours, and I don't know what we have done this year but it looks like we are going to get a few next year which is great!

I Do you have any stories or incidents which best describe how students skills develop during their Honours year?

P Student skills? Hmm. [pause] OK, maybe this year there is a particular student that I am co-supervising in their research project. And the research project involves a technique that has recently been published in the literature, for doing some ... Because it is expensive to ..., so if we do it from the surface it is a bit cheaper. Another group in another country have been pushing in a number of papers over the past few years, a particular way in which this remote sensing is being done. Here at Newcastle we have had one or two doubts.

So here at Newcastle we thought what we would do is to propose an Honours project whereby we would have the student (it is sort of interesting because we didn't want to tell them too much to bias them, but at the same time we had to tell them enough so that they knew where they were working, so it was a little bit tricky), but with this particular student the research skills that they actually developed, we gave the students specific information to know what the procedure was that was published, then said OK we want to look at this to see if it is actually going to fly, or debunk them.

Now obviously when you tell the student all this stuff at the beginning, some of it goes in and the rest doesn't, you know we all understand that, so this student got hold of this and painstakingly researched the whole thing, and went step by step checking every assumption and developed the skill of critical analysis, both in the literature and in his own procedures and assumptions of what he was doing which involved a little bit of ..., because in [My Area] you have some data but it is not all that comprehensive, because of this expense.

There was some experimental data to fold in to the modelling, and he went through the assumptions of this particular group, and it turns out that the report that is written shows that these guys are perhaps pushing the data a little bit beyond what it actually says. I had actually mapped the project out, assuming that the research showed that we agreed with what had been published, and then there was an extra step to go, so when we got to this point, when he actually showed that they weren't quite right, we had to go on a different tact.

Essentially what the student's skills developed into was this reminder that he had to be very careful of what assumptions he had, what other people were saying, even though it was published literature and accepted by the community as peer review, that it may not necessarily be correct and that it may change depending on what further knowledge that we find, and he was part of that process.

So, what did he learn? He learnt critical thinking, he learnt to be a little bit sceptical about the published literature (it may not be a good thing, but then again it may be a healthy thing), he learnt some of the excitement of disproving an American Theory, you know people who had been in the game a lot longer than him, he learnt that he could actually make a contribution, and that I think was valuable. Just be using some fundamental and careful work, and he thoroughly enjoyed the whole process.

At this point he has to write it up obviously and he has to put it out there is the literature and he will have to deal with the referees comments, the reviewers , the editor and so on, and justify his position, which will be some other skill that he will have to learn. How to phrase things when replying to reviewers comments.

I That is all my questions. Do you have anything we haven't covered that you would like to add?

P Some of the skills, I have talked about the research, I am just thinking about the coursework. An undergraduate degree in [My Area] you learn to time manage anyway, plus you have in addition to the lectures and tutorials or have the lab component as well, so that is 3 hours extra than a course you might do in Education or something like that. I know when I did my education subjects it was 3 hours a week, it might have been 4, but that was it. While you are doing, and even with Maths, it is the same. But while you are doing [My Area] or some lab based courses, you have got this extra 3 hours you have got a lab in. So you learn to time manage, because things are a little bit tight. But in Honours it is even more so.

There is some discussion I guess about whether the students are being pushed a little bit too much in terms of their time, but anyway. With the coursework you have the normal assignments plus the research on top.

So they have to learn a little about managing their assignments, how much they are going to spend, and sometimes they may not have time to do their very best, so they have to try and think about well this assignment I know a little bit about, or this assignment I don't know much about so I am going to have to really do well on this one because I know so much about it. So where am I going to put my time, sort of thing. So there is a whole organisational skill in prioritising skill, even though it is not formally taught it is imposed upon them.

Then the other thing that I might mention is that in [My Area] we don't actually give them a formal course in computer skills. In the basic degree they can chose one of the basic computers courses in the Faculty, which teaches them a bit about excel, word, or how to write stuff, a bit of database or webpage. But by the time you get to advanced [My Area] you have got to be able to do some Maths on the computer, and they are not actually formally taught that.

There is one course in Maths at second year level which teaches them how to use 'Mathematica', I think, so it teaches them a little bit of symbolic programming at solving equations. By the time they get to Honours level and they are doing the research project, and they are getting data off their instruments, then what? They have got to have the skills to analyse it is a particular way, either which the statistics they have got to do or the information content, the frequency content perhaps, or whatever.

We have tried to address that by giving them a formal course in ..., which I teach them, but apart from that the actual getting down on the computer and actually learning some sort of computer language, we actually never give them a course on that although by the time they get to Honours level they are expected to know that skill.

And we do have students that come through, even my third year students, hate computers! I actually find that quite strange because with using the computer for ... and Maths it actually helps, helps you solve problems, and they obviously haven't got over that hurdle. We actually did actually try and instigate a course in computer modelling, which still runs, but I understand that they now do it mostly in excel, so they are given some sort of mathematical equation and they have to do the numerical approximation to that, and solve it within the spreadsheet. To me that defeats the purpose because by the time you have got data coming off your instrument, there is a limit to what you can do in Excel. Certainly pulling data in and doing pi and dependent sort of analysis and all that sort of stuff, you are limited in Excel.

There are other scientific programs out there, I mean the traditional one is Fortran, because it is a good compiler, and efficient compiler and you can run things very quickly. But we never really give them a formal course in any of that. And we are not likely to get one, because in the current climate you have to be able to guarantee a certain number in a certain course. The one at Honours tries to address some of that, but at undergraduate no. I mean in third, even the third year labs they are expected to get on a computer and present some of the results, and so I guess what we are saying really that in the lab program in the undergraduate they are expected to pick up this skill. There are one or two labs that are geared towards the computer, it is assessed in terms of the lab mark, it is not assessed in the exam or anything like that.

Most of the Honours students find the Honours year busy. So if you come along and meet with them they will tell you it is very busy, but on the whole if you were to survey them (we rarely have those with negative experiences) but the students can get so worn out at the end of November that they don't want to see another book or another ... for a couple of weeks.