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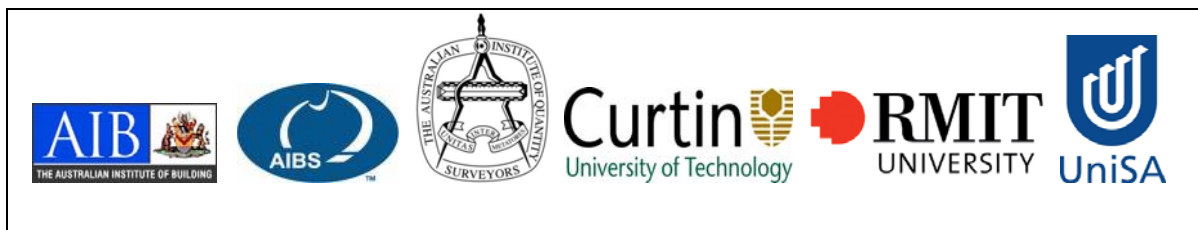
Promoting excellence in higher education

Construction education in Australia: a review of learning and teaching challenges and opportunities

Lead Institution:

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

Partner Institutions:

AIB THE AUSTRALIAN INSTITUTE OF BUILDING — AIBS — THE AUSTRALIAN INSTITUTE OF QUANTITY SURVEYORS — Curtin University of Technology — RMIT UNIVERSITY — UniSA

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Human Ethics Clearance

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EXECUTIVE SUMMARY

This report documents the first comprehensive study of university Construction education in Australia. The project was funded by the Australian Learning and Teaching Council (ALTC), as a Discipline Based Initiative project, and provides a detailed overview and analysis of the issues facing the providers of Construction (construction management, quantity and building surveying) degrees in Australia. This report achieves the following:

- showcases the disciplines to all stakeholders including universities, industry and community and makes clear that the disciplines of construction management, quantity surveying and building surveying (collectively referred to hereafter as Construction disciplines) deserve greater recognition for their contributions to stakeholders' interests
- raises self-awareness of the disciplines' characteristics, issues, opportunities and boundaries
- identifies teaching and learning challenges and opportunities for Construction providers and highlights directions for future changes and developments
- provides a foundation for future research into Construction education across the region
- identifies areas for future research and changes required for the disciplines

The project started in August 2007 and ended in December 2008. An initial literature search informed the development of an on-line survey which was administered to all full-time academic staff teaching Construction in Australian universities in April and May 2008. Subsequently, a sample of staff and students at 11 of the 12 universities offering Construction degrees participated in interviews and focus groups. Supplementary data was obtained from the Department of Employment, Education and Workplace Relations (DEEWR), the AIQS and various other sources. These were analysed and trends and issues identified. The Project steering committee was kept abreast of progress. Newsletters to keep stakeholders informed were published on a regular basis (in all, five newsletters were circulated during the project).

The report offers 14 recommendations for Construction education. These are summarised below.

Recommendation 1: Improve funding of Construction education

The current funding differentials between Construction and other disciplines are embedded in government models which are outdated and limit the extent to which Construction disciplines can reach their research and teaching potential. A suitable funding model needs to be devised and adopted to support Construction education. This would work to alleviate staff workload pressures.

Recommendation 2: Rationalise and integrate accreditation requirements

Accreditation processes need to be streamlined. The Washington Accord model (used for engineering degrees) provides a useful and informative exemplar in this regard. It is important that any streamlining initiative results from a coordinated approach involving universities, professional bodies and industry.

Recommendation 3: Address staff shortages for current and future needs

Action needs to be taken to address staff shortages. The Construction academic workforce is aging and is not being replenished. The university sector and the construction industry need to work collaboratively to encourage graduates to enter academia.

Recommendation 4: Adopt strategic approaches to improve promotion rates

High quality staff need to be attracted to university teaching. High-achieving students should be encouraged to apply for academic posts in Construction disciplines. This can be achieved by emphasizing the contributions that Construction professionals make to society. In addition, stronger partnerships need to be developed between industry and universities to promote industry-focused research projects and improve the research profile of the disciplines.

Recommendation 5: Overcome fragmentation of curricula

Construction curricula are highly multi-disciplinary and tend to become fragmented. Academic leaders must be aware of this issue. Programs of learning should incorporate mechanisms to help students understand how the components of their curriculum relate to each other. Support needs to be provided to help academics develop integrated learning experiences for their students.

Recommendation 6: Avoid overcrowding of curricula

Construction academics need to consider inter-disciplinary subjects/courses as a way to address the curriculum requirements of stakeholders. Guidance concerning the practical limits of rationalisation needs to be prepared for the disciplines and university managers.

Recommendation 7: Address teaching and learning issues

Construction education is multi-dimensional and these dimensions need to be effectively integrated. A variety of approaches need to be developed and shared between Construction providers. The resulting resources could be disseminated through the online resource portal outlined in Recommendation 14.

Recommendation 8: Exploit opportunities for Work Integrated Learning (WIL)

Opportunities for Work Integrated Learning (WIL) need to be comprehensively exploited. Construction students are required to complete periods of industrial experience but the extent to which this is facilitated, monitored and evaluated is inconsistent across the sector. The Construction professional institutions are encouraged to review their requirements, and enter into a dialogue with universities to discuss ways of more fully exploiting opportunities for WIL.

Recommendation 9: Expand and enhance assessment of teamwork

Teamwork is a significant core skill of Construction graduates. The findings of this study indicate that the assessment of team activities is problematic in some Construction programs. Providers should review the amount of teamwork their students complete, and the assessment approaches used.

Recommendation 10: Establish a forum for educational research

There is no appropriate forum within Australia for the development and dissemination of research into Construction education. A biennial journal, supported by the disciplines' primary academic bodies or a group of institutions, should be developed and supported.

Recommendation 11: Balance students' work and study

Many Construction students combine work and study. A comprehensive study of the implications of students' workloads needs to be conducted. Industry needs to take a major role in this study as well as the universities offering Construction programs.

Recommendation 12: Establish a teaching-research nexus

Many Construction disciplines are restructuring their curricula to align staff research abilities and interests with appropriate study areas. This provides a unique opportunity to develop a strong nexus between teaching and learning. AUBEA should promote a strategic approach to developing networks of academics and clusters of interest groups based on research or curriculum interests.

Recommendation 13: Improve communication between industry and academia

Clear communication channels between industry and academia need to be promoted and fostered. Construction programs would benefit from Industry being meaningfully engaged in curriculum design, delivery and renewal.

Recommendation 14: Establish a portal for Construction education resources

Construction schools tend to operate in isolation and rarely exchange information about their teaching and learning practices with others institutions. An exchange mechanism is urgently needed.

1. INTRODUCTION

The project reported here aims to develop an understanding of the key curriculum, teaching and instructional challenges facing Construction disciplines in Australia. It will inform future projects in these disciplines and allow for benchmarking with other Australian and international best practice. This report does the following:

- identifies the challenges facing Australian Construction education in maintaining and improving its quality, responsiveness and competitiveness in a global educational environment
- creates an agenda for future educational research and its dissemination into specific initiatives which support and enhance educational practice across the sector
- ascertains the change readiness of Construction education units, their staff, professional institutions, government bodies and business and employer organisations

1.1 Reflecting on Learning

What is important is to keep learning, to enjoy challenge, and to tolerate ambiguity. In the end there are no certain answers.

(Martina Horner—President, Radcliffe College)

Horner's quote (see Quoteworld.org, 2008) encapsulates the challenges the authors of this report faced. The remit of the study was broad and required an investigation of many diverse areas which of necessity required the authors to reflect on and learn about their disciplines. In addition it was necessary to accommodate ambiguities, as some data were difficult to obtain and interpret. Many issues were unearthed including, for example, that Construction disciplines were found to be under-resourced, and that recruitment and succession planning are likely to present significant challenges in the future. These all reinforced the need for this study.

For **Construction educators** this report provides a robust record of the state of Construction university education in 2008. To date, annual conferences of the Australasian Universities Building Education Association (AUBEA) have been the primary forum for Construction educators to share their views, discuss prevailing issues and set new agenda. The proceedings of these conferences have been wide ranging, and do not comprehensively address issues in the breadth and depth that this project has had the opportunity to do. To reiterate, to date there has not been an all-inclusive study of the university programs which offer Construction education in Australia. The need for such a study is long overdue and is endorsed by literature. For example, Hagar, Garrick, Melville and Crowley (2001) argue that construction education is becoming increasingly fragmented and specialised and that this is resulting in a lack of breadth of skills being taught and learnt (Hager, Garrick et al., 2001). Other issues identified in the literature include the following:

- a low level of qualifications across the industry
- poor access to resources
- a decrease in practical experience within subjects (due to OH&S reforms)
- an increase in students studying part-time

- issues related to course structure

  (see Ashford & Mills, 2006; Hager, Garrick et al., 2001; NCVER, 2000; Taylor, 2004; Clive Warren, Birch, & Westcott, 2005)

For **industry** this report helps close the gap between education and industry practice. More specifically, it highlights the separate needs of stakeholders. Dissemination of the findings of this report will pave the way for future dialogue with industry. It is hoped that this will lead to change and will encourage engagement with and support from industry.

For **students** this report highlights the importance of the disciplines and the contributions they can make to their education. It aims to make students more aware of the disciplines and the issues they, their tutors, employers and accrediting bodies face. Students may also be encouraged to use this report as a stimulus to create student communities.

For the **community** at large, this report publicises the fact that a degree in construction management, quantity surveying and/or building surveying is vastly different to being a tradesman on a construction site. The report argues that stronger recognition of the disciplines, their vocational strengths and the issues and opportunities they face is needed. With community awareness raised, the profile of Construction professions will be enhanced, and the gender imbalance experienced in all sectors of the industry may improve.

This report investigates the issues highlighted in relevant literature, and identifies other issues which have had an impact on the disciplines. It promotes a national shared understanding through collaboration between the Construction education providers, their students and the professional accreditation bodies. As a consequence it sets out ways in which the disciplines may progress in the future.

Notwithstanding the opportunities available to Construction educators to share views at AUBEA and similar events, few are fully conversant with contemporary concerns. Some may be aware of issues at their universities but few have knowledge of the teaching and learning practices of other universities. The reality is that schools of Construction all share similar educational challenges, resource concerns and academic management issues. There is no doubt that Construction providers can learn from each other and improve the delivery of Construction education nationally.

Construction academics are members of professional and scholarly societies (including AIB, AIQS, AIBS, RICS, CIOB, and others). There are approximately 120 academics across the nation. At least 200 casual staff members and a large number of general staff (including administrative assistants, librarians, computer programmers and laboratory technicians) support their teaching. Each year almost 4000 students are enrolled in Construction programs throughout the nation. On average, these students submit approximately 65,000 assignments a year, complete 8000 examinations and undertake periods of practical experience in industry. Each year a typical full-time Construction academic assesses more than 200 assignments, teaches workshops of 100 hours and lectures up to 200 hours. In addition, they supervise higher degree students and are involved in a growing range of administrative duties. During whatever time they have remaining, they research a wide range of construction-related topics, apply for research grants and publish and present their findings.

Locally, these Construction disciplines are accredited by the following organisations:

- Australian Institute of Building (AIB)
- Australian Institute of Quantity Surveying (AIQS)
- Australian Institute of Building Surveyors (AIBS)

These represent the national professional bodies for these sectors of the industry. In addition, many are also accredited by international professional institutions such as the Royal Institute of Chartered Surveyors (RICS), the Chartered Institute of Building (CIOB), and several others.

The largest numbers of students are enrolled at RMIT University (RMIT), University of Technology, Sydney (UTS) and Queensland University of Technology (QUT). Only two of the universities which offer Construction subjects are located outside capital cities. These are Deakin University (which is in Geelong, Victoria) and The University of Newcastle (which is in the city of Newcastle, New South Wales).

This report provides a detailed overview of the disciplines that encompass the Construction education domain, including a profile of the Construction academics employed in each university, the current position of the disciplines and prevailing concerns. While this report provides an overview, its ultimate focus is on teaching and learning, the pedagogical challenges the disciplines face, and the scholarly and instructional opportunities available. It offers possible solutions to these challenges and provides responses to existing opportunities by providing advice on how these issues could be usefully approached. It should be noted that this advice is preliminary, and further, more detailed work needs to be undertaken.

1.2 Content and structure

Chapter two provides a context for Construction education in Australia today. It begins with a brief history of building and construction education from a global perspective and then identifies current trends related to Construction programs, staff and students. It also provides a discussion of the limitations of the data sourced. Following this, the chapter provides an overview of the available programs of study. It maps the weighting of different curriculum areas. General trends in curriculum structure and content over time are identified and discussed. A summary of staff and student trends is provided. This chapter then presents an overview of the different forces which shape construction education today, including four stakeholder groups who impact the Construction disciplines. Whilst these stakeholders have a direct influence on Construction education, most do not actively assist in teaching students. The requirements of these stakeholders are shaped by changes in society, generational shifts and market forces and this section primarily describes the pressures they exert on the Construction disciplines. All of the material in this chapter frames discussions in the following chapters.

Chapter three describes the scope of the project and the range of methods used to collect information about the Construction disciplines. A combination of literature reviews, surveys, interviews and focus groups were used to elicit data. Quantitative and qualitative techniques were used to analyse the data. Each of these methods has strengths and limitations and these are explored in this chapter. By combining these approaches it was possible to overcome many of the limitations inherent in individual methods.

The next three chapters are concerned, respectively, with the Construction programs, academic staff and students. Discussions are structured around the themes of 'University Pressures' and 'Industry Pressures'. Each chapter concludes by considering issues for teaching and learning which result from these pressures. While the analysis typically extends to the level of individual construction schools or departments, for the majority of cases only higher level aggregated results are reported.

Chapter four, the programs chapter, identifies issues relating to curriculum design and renewal in relation to the pressures previously identified. Some of these include a lack of status within university structures and issues with the industrial experience component of the programs.

Chapter five investigates the full-time academic staff employed in the disciplines. It documents staff numbers, qualifications and backgrounds, promotion trends, age and gender.

Issues such as increased workload, research pressures, teaching pressures, recruitment and industry experience are also considered.

A profile of construction students is provided in **chapter six**. The number of students, their gender and backgrounds (international, domestic and indigenous) are reported together with an analysis of commencing and completing student ratios. Issues such as the influence of Generation Y traits, poor attendance at lectures and tutorials, and working in industry whilst studying are also explored.

The final chapter, **chapter seven**, summarises the issues identified in the study and offers some possible solutions, particularly in relation to improving teaching and learning. The intention of this section is to assist future researchers to focus on issues that are of national and regional significance, and to plot future research projects to improve Construction education.

2. CONTEXT: CONSTRUCTION IN AUSTRALIA

This chapter describes the context in which this project was conducted. It provides an overview of the construction management, quantity surveying and building surveying (Construction) disciplines offered at Australian universities. It also includes a summary of the contents of the various degree programs as well as of the composition of their staff and students over the past six years. It starts with a brief history of the construction industry and then describes tertiary level Construction education in Australia. The chapter concludes by identifying some emerging trends and describes how these might impact on the disciplines.

2.1 How the past has shaped the present

Humankind has been constructing buildings from time immemorial. As buildings grew in size, it became necessary to get more and more people to assist in their construction. Similarly, as buildings became more complex, the expertise of people with specialist skills needed to be enlisted. Today the range of services and skills employed on buildings is vast. As an illustration of how involved construction can be, consider the New York World Trade Centre transportation hub (due for completion in 2014). According to International Construction Review (ICON, 2008:26) this project involves 19 public agencies, two private property developers, 101 different construction contractors and sub-contractors, and 33 different designers, architects and consulting firms. Clearly, construction has evolved into a complex process requiring construction professionals with an extensive and diverse range of knowledge, skills and attitudes.

Before reflecting on how modern construction industries impact on university education, it is informative to briefly review how construction professions have evolved. In this context it is convenient to consider two perspectives—that of 'design' and that of 'construction'.

2.1.1 Design

Architects have historically been responsible for interpreting clients' requirements and translating them into design drawings. Over the centuries design has become a multi-disciplinary activity incorporating architects, engineers and specialist design professions. Cole (2007:100) notes that "Large projects now use input from dozens of specialists, the 'emerging professions', (e.g. 'Lighting, acoustic, circulation, IT specialists . . . ')". One profession that is particularly relevant to this report is that of quantity surveying. Historically "the measuring role of a quantity surveyor had been carried out by a number of individuals including the architect, surveyor and the master artificer" (Hinds, 2008:1). These measurement activities have been incorporated in the profession of quantity surveying.

Construction professions have developed their own identities over time. According to Cole (2007:100) from the mid 1700's until the 1950's "the largest of projects normally required input from few professions, viz., the architect, a civil (and later) a mechanical engineer, a quantity surveyor and a (master) builder". It was not until the 1970's that these professions became more specialised and clearly defined.

2.1.2 Construction

From a 'construction' perspective, responsibility for managing the men, money, mechanical equipment, materials and minutes (sometimes known as the "5 m's") required to construct buildings has evolved over time. The history of the management of Australian construction

projects has not been documented extensively. It appears that practices have been largely influenced by trends in Europe, America and the Asia Pacific (Gimesy, 1992). The first builders in Australia were builder architects and drew their knowledge (and to begin with bricks as well) from the UK (Gimesy, 1992). It was not until 1865 that the first building courses started at the Sydney Mechanics School of Arts, New South Wales as a drawing class (Gimesy, 1992:35). The first formal education of quantity surveyors in Australia was a diploma course at Sydney Technical College in 1928, that covered "fourteen subjects over four years, though classes in quantities were being held regularly as early as 1888 at the Sydney Technical Institute" (Lenard, 2008:215). Queensland had a quantities course which started in 1935, Victoria one which started in 1949, and South Australia Technical Institute started one in 1948 (Lenard, 2008). At the time, Construction education was delivered largely by technical institutes. Students found a building job and attended part-time evening courses (a practice similar to the UK where construction was taught in polytechnics and later at universities) (ATN, 2004; Lenard, 2008). Indeed five of the universities in this study (Curtin, QUT, RMIT, UNISA and UTS) were formerly institutes of technology. The first specialist degree courses in building surveying began in the 1990's in Australia (Cole, 2007:101).

Construction managers require skills that complement elementary design and engineering attributes (Woudhuysen & Abley, 2004). A new academic discipline of 'building' has emerged, which aims to graduate students with knowledge and understanding of both technical issues relating to constructing buildings as well as commercial, financial, legal and related managerial aspects. In this regard, it is important to note the legal liabilities that 'builders' are subject to. In NSW, builders must comply with and be aware of all changes in legislation. If an engineer or architect designs work that does not comply with, for example, the BCA or any law or instrument the liability rests with the builder (not the engineer or architect). This liability places very real responsibilities on those that provide education to Construction students. The following quote emphasises the need for Construction academics to have relevant and up to date experience:

> *. . . university academics should have practiced in industry as: Construction and Project Managers; Quantity Surveyors; and Building Certifiers/Surveyors [while] . . . existing academics' CPD should include return to industry practicing/observing these roles.*
>
> *(Report Advice 15th April, 2009)*

The first building degree was accredited by the Australian Institute of Building (AIB) in Adelaide in 1958, "followed by another the same year in Melbourne and a third in Sydney in 1960" (AIB, 2004: Course Accreditation). Recently the term 'building' has fallen out of favour as it implies that graduates are restricted to managing the construction of buildings. In fact, their skills are relevant to civil engineering projects as well, and the all-encompassing term 'construction' has become popular in many quarters.

2.2 The present

The lineage of Construction disciplines has influenced the way they are perceived and taught in Australia today. Many exist with other disciplines (such as property and industrial design) in schools, departments or other academic units. Construction arguably lacks a unique identity which may, in part, be due to its close association with higher profile disciplines such as architecture and engineering.

In addition, perceptions about academic disciplines are influenced to a large extent by the research they conduct. Research in building/construction management is mostly applied (and usually multi-disciplinary) and does not attract the same recognition as the fundamental

research conducted in other disciplines (e.g. science and engineering) (CNBR, 2008). This is manifested in a lack of kudos from academics in other disciplines, and difficulties in obtaining research funding, all of which compound the challenges faced by researchers in Construction disciplines. This also occurs in America where, as Rosenbaum et al. state, "construction education still copes with painful realities—that the discipline is an academic stepchild to larger programs on campus, that it lacks financial strength and its graduates technical depth, and that its welter of titles can leave students, recruiters and guidance counselors confused and uninterested" (Rosenbaum, Rubin, & Powers, 2001:26).

Furthermore, the boom/bust nature of the construction industry has also led to a hand-to-mouth existence for many Australian Construction programs. The fact that these disciplines are relatively new means that they have been subjected to many changes as well as cyclical student intakes. The educational landscape for Construction programs has evolved significantly for a number of reasons, including changes in government funding, information technology initiatives and on-site training packages (Ashford & Mills, 2006; Hager, Crowley, & Melville, 2001; NCVER, 2000; Pick, 2005; Star & Hammer, 2008; Taylor, 2004; Clive Warren et al., 2005).

Presently 12 universities provide tertiary education for the Australian construction industry. Construction graduates are in great demand (although the current economic climate presages a downturn in job opportunities). At present universities are experiencing buoyant enrolments.

This section has described the relatively recent origins of Construction disciplines, the development of these professions both overseas and locally, and education in Construction professions. These have influenced the way they are perceived and taught in Australia today.

2.2.1 The curricula

This study has investigated the 12 universities that educate Construction students in Australia (shown in Table 1). Table 2 records the names of the various Construction degree programs offered at these universities. There are also other institutions that offer construction management, quantity surveying and building surveying degrees. These include the University of Canberra, Holmesglen TAFE, Monash University and The University of Queensland. These were not included for a variety of reasons: the program offered at the University of Canberra is new and no data are as yet available; TAFEs were specifically excluded from this study and Holmesglen was therefore not included; and Monash University and The University of Queensland teach construction subjects as part of other programs and it was therefore deemed inappropriate for them to be included.

State	Institution
NSW	The University of Newcastle (UN)
	The University of New South Wales (UNSW)
	University of Technology, Sydney (UTS)
	University of Western of Sydney (UWS)
Queensland	Bond University (Bond)
	Central Queensland University (CQU)
	Queensland University of Technology (QUT)
South Australia	University of South Australia (UNISA)
Victoria	Deakin University (Deakin)
	RMIT University (RMIT)
	The University of Melbourne (UM)
Western Australia	Curtin University of Technology (CUT)

Table 1: The providers of Construction programs in Australia

There was overlap between the curriculum areas offered at these universities. Different program providers located various knowledge domains in different parts of their curriculum. Furthermore, only the past five years for course guides were analysed and this provided a snap-shot representation of these programs. To further complicate this situation, the programs were continually being changed and this made them difficult to track. These challenges are illustrated in the following extract from an interview with a Construction academic:

Building surveying is part of our study. I don't think we realised that you did that here.

(Facilitator)

We had that until 2000. It doesn't exist in the website. That's why you didn't see it. But if you'd have gone a couple of years back, we had that sub-major with seven units.

(Interviewee)

But that's not planned for the future anymore?

(Facilitator)

We'll see how we go through this recruitment process.

(Interviewee)

(Interview Head of Programs K1, 2008)

This quote illustrates some of the challenges that were faced when mapping the disciplines' curricula. Indeed there are differences between programs that are not apparent at first glance. For example, Deakin University provides an accelerated three year degree by offering courses during the summer recess, The University of Melbourne has adopted the 'Bologna Model' (an innovative 'unitary' degree system adapted from Europe) (Ashford & Francis, 2007a), and Bond University operates on a trimester basis enabling students to graduate in three years. Furthermore, it became apparent that significant additional changes are planned in a further four universities. Notwithstanding these challenges, the key components of the Construction curricula were analysed and the weightings of degree components over the past 5 years quantified. Figure 1 shows the curricula content of each Construction program in 2007 (excluding Bond University, as the degree offered there is new (first offered in 2006) and courses were not listed in their curriculum handbooks and their website at the time of writing).

Name of degree	Provider
Bachelor of Property and Sustainable Development	Bond
Bachelor of Building Design	CQU
Bachelor of Construction Management	CQU
Bachelor of Building Surveying and Certification	CQU
Bachelor of Applied Science (Construction Management & Economics)	Curtin
Bachelor of Construction Management	Deakin
Bachelor of Urban Development (Construction Management)	QUT
Bachelor of Urban Development (Quantity Surveying)	QUT
Bachelor of Applied Science (Construction Management)	RMIT
Bachelor of Planning and Design (Property Construction) (3 year) + Bachelor of Property and Construction (1 year)	UM
Bachelor of Construction Management (Building)	UN
Bachelor of Construction Management & Property	UNSW
Bachelor of Construction Management & Economics	UNISA
Bachelor of Construction	UTS
Bachelor of Construction Management	UWS

Table 2: The Construction programs offered at Australian universities
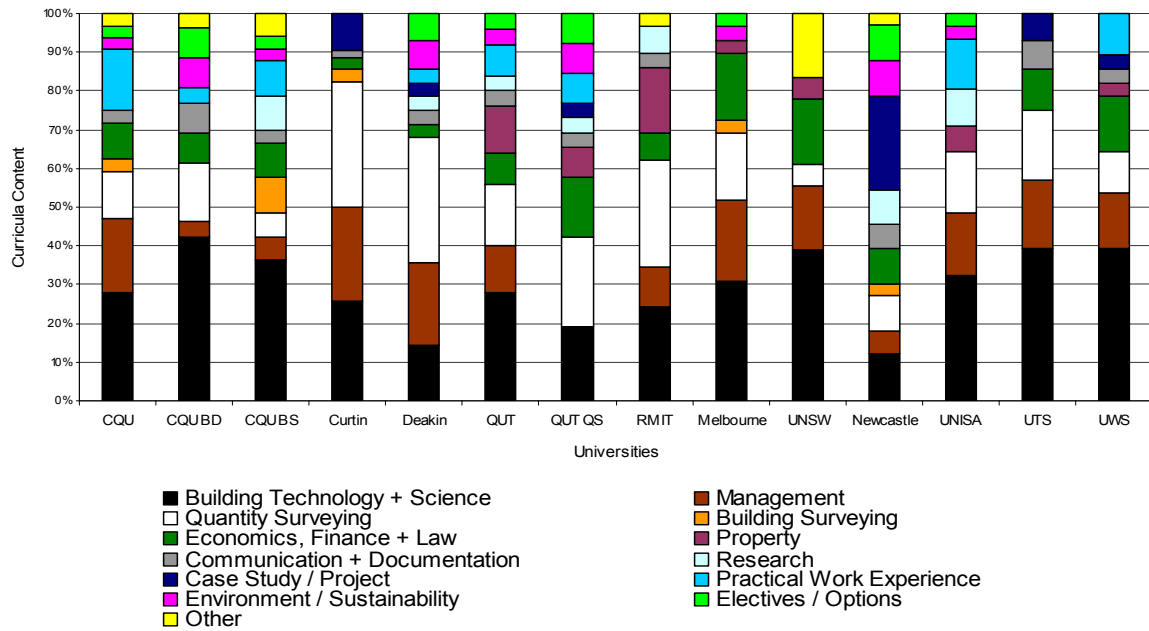
Figure 1: Construction degree content (2007) (Source: University websites and AIQS tertiary course guides)

Figure 2 provides an overview of Construction programs, comparing content areas available in 2003 with those delivered in 2007. It highlights the fact that programs have shifted emphasis and reflects positively on the disciplines as it provides evidence of their review and renewal. A more detailed discussion of pressures on curricula is provided in the next chapter.
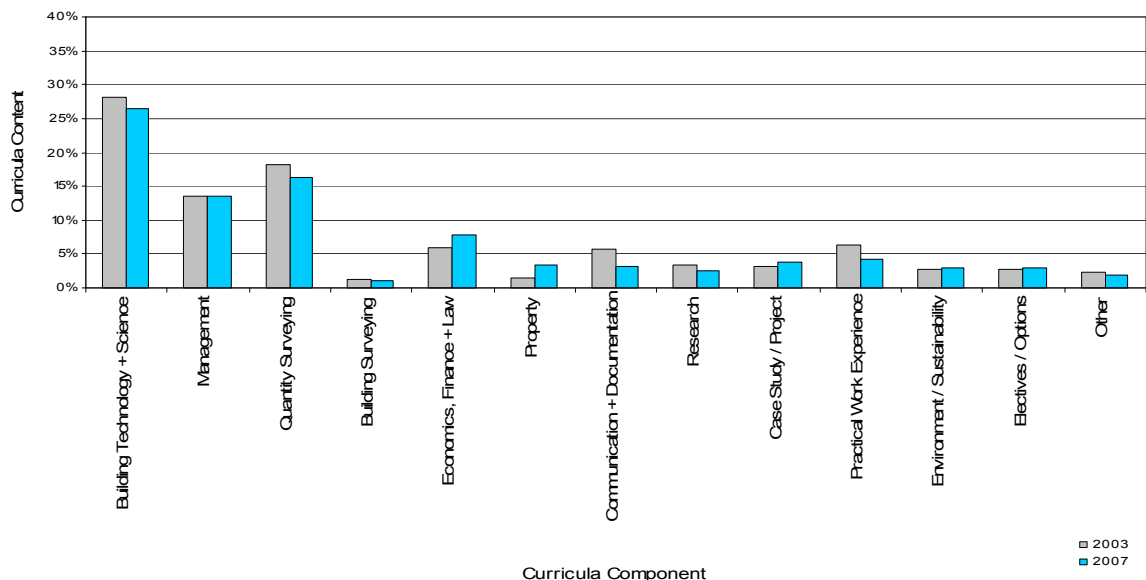
Figure 2: Course content (2003 compared to 2007) (Source: University websites and AIQS tertiary course guides)

Figure 1 and Figure 2 have been sourced from program curricula set out in AIQS tertiary course guides (AIQS, 1997-2007) and university websites. As such, they provide an overview

of similarities, differences and trends within Construction courses and programs across Australian universities.

2.2.2 Academic staff

This section provides an overview of staff trends in the Construction disciplines and describes the difficulties encountered mapping these data. Figure 3 shows the number of staff who taught these disciplines in 2007. These data were compiled from university websites. 129 staff were employed in NSW, Queensland, Victoria and Western Australia (mostly as 'lecturers').
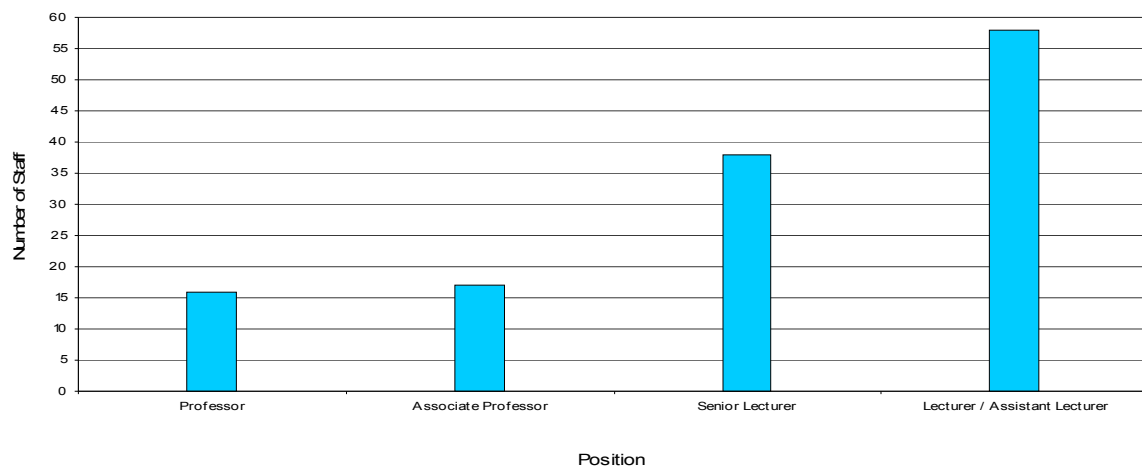
Figure 3: Total number of academic staff (March, 2008) (Source: University websites)

Figure 4 shows a distinct gender bias amongst lecturers. Considerably more males are employed as academic staff teaching in Construction disciplines.
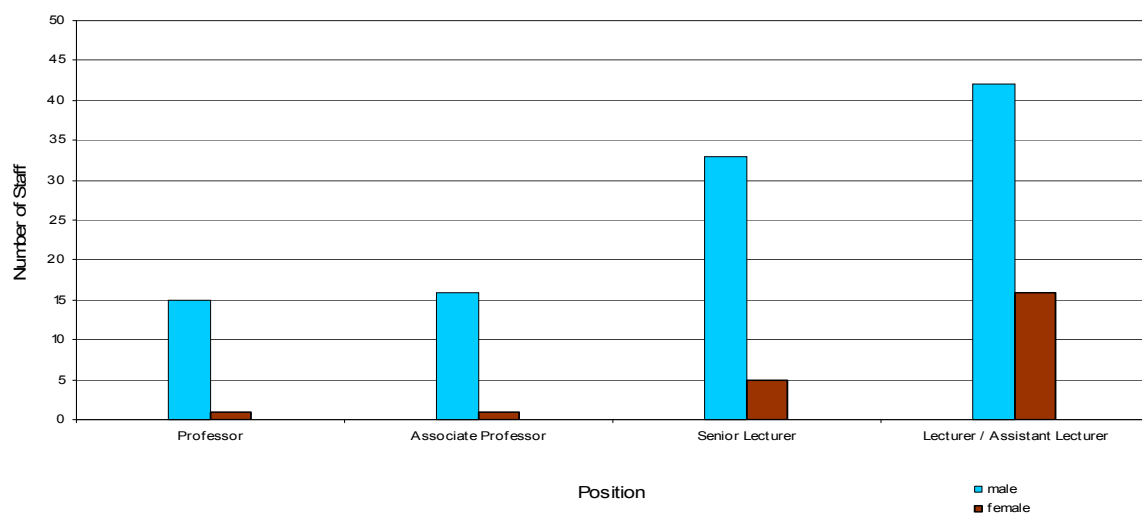
Figure 4: Gender of Construction academics (by position, March 2008) (Source: University websites)

Figure 5 illustrates the age profile of academic staff who responded to the on-line survey. Respondents were predominantly in the 36-55 year age bracket. This emphasises concerns noted in relevant literature (A. Dainty, Grugulis, & Langford, 2007; King, 2008) that academic staff are not being attracted to universities. The reasons for this appear to relate to the salary differential between industry and academia, the (current but volatile) high demand for these professions in industry, as well as requirements that new staff have (or are enrolled in) research higher degrees. In this connection it is worth noting a recent initiative of the AIB, who are attempting to garner support for increasing the salaries of construction academics (AIB, 2008a). The proposed emoluments would be similar to the practice payments offered to academics in some medical fields.
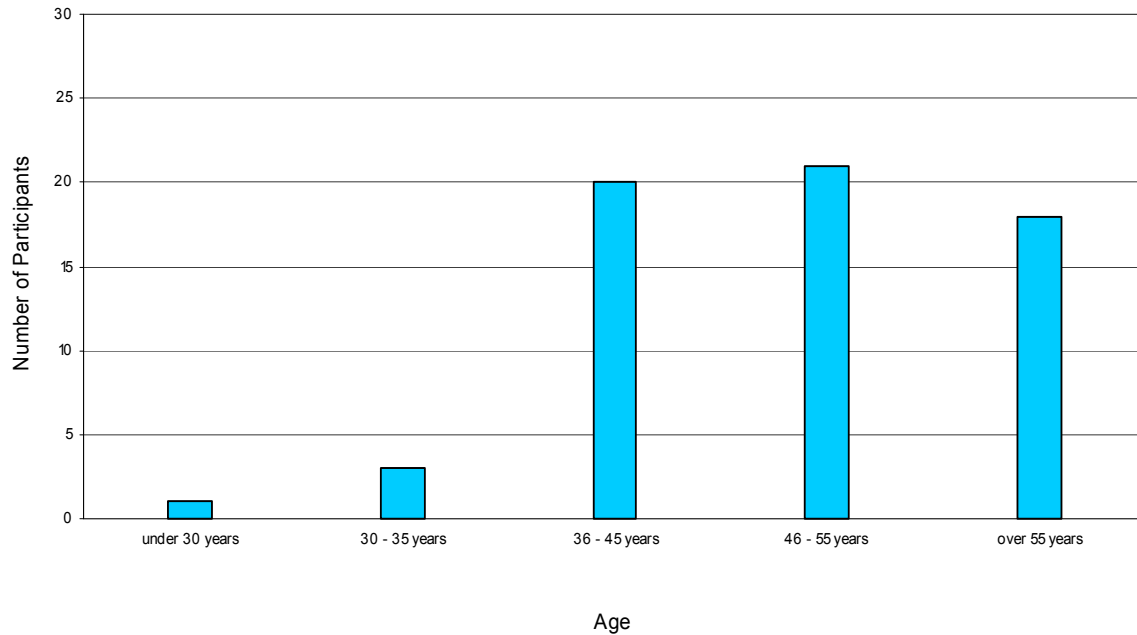
Figure 5: Age profile of Construction academics who responded to the online survey (Source: Online Survey)

It should be noted that there were inconsistencies in the ways the various universities identified their staff. As a consequence the data provided in this chapter and in Chapter 6 include the property, business, engineering and architecture academics that contributed significantly to the delivery of Construction programs. A further complication resulted from an unexpected emphasis on sessional (part-time and casual) staff at some universities. The main reason for this appears to stem from difficulties in recruiting suitably qualified full-time academics. Sessional staff are usually practitioners drawn from industry and their knowledge of contemporary practices and current projects appears to be well received by students. Notwithstanding this and unless otherwise stated, sessional staff have been excluded from the data and analyses presented in this report.

This section has provided an overview of trends in the number academic staff employed in Construction disciplines. Additional data relating to academic staff (including their qualifications, roles, and related issues and opportunities) are provided and discussed in Chapter 6.

2.2.3 Students

In 2001, the total number of Construction students in Australia was 3702, including enrolling, continuing and completing full-time students.   By 2006 this number had grown to 4016 (as shown in Figure 6).

Growth in student numbers has been uniform throughout the six-year period studied and is consistent across each of the universities.   This growth has occurred for several reasons including an increased awareness by students of Construction career paths (a trend identified by Warren et al (2005) especially in relation to quantity surveying and building surveying). Furthermore, a significant number of school leavers are choosing to go to university instead of entering the workforce (Star & Hammer, 2008).
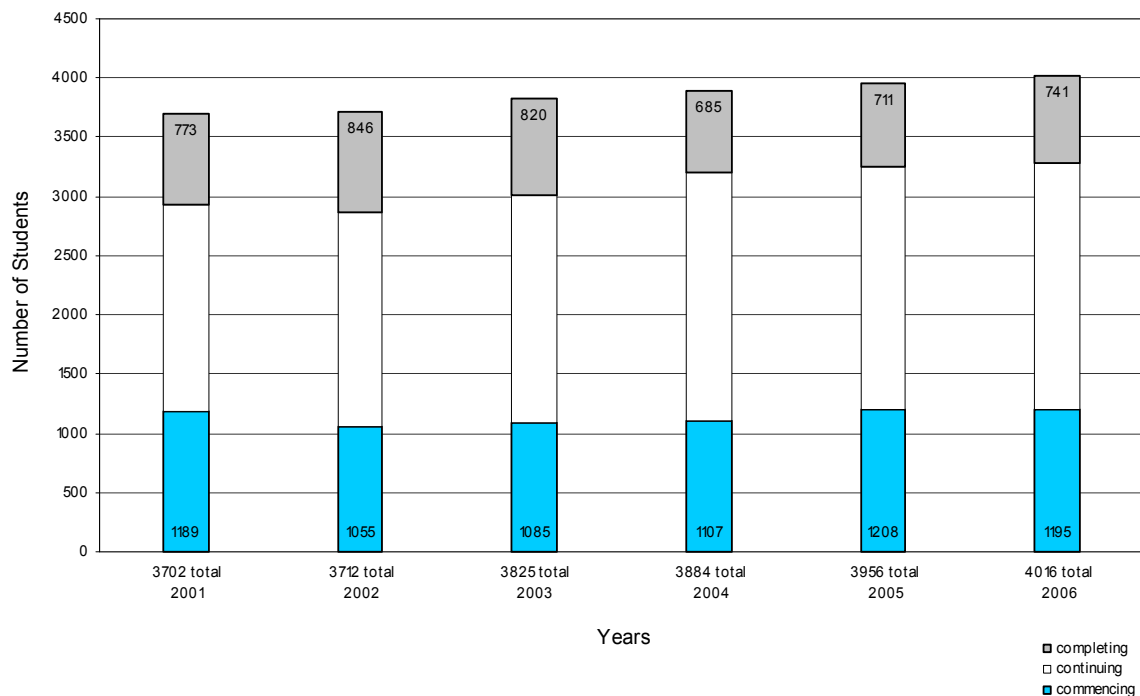
Figure 6: Construction students completing, continuing and graduating (2001 – 2006) (Source: DEEWR)

Figure 7 shows that the Construction student population is predominantly male. No female population growth in these disciplines is discernible. This situation, when considered in conjunction with the ratio of male/female academics, is a concern for the Construction disciplines and for the manner in which they are perceived by the wider community. More trends in student numbers (including domestic and overseas intakes, and individual university enrolments) are explored in Chapter 6.
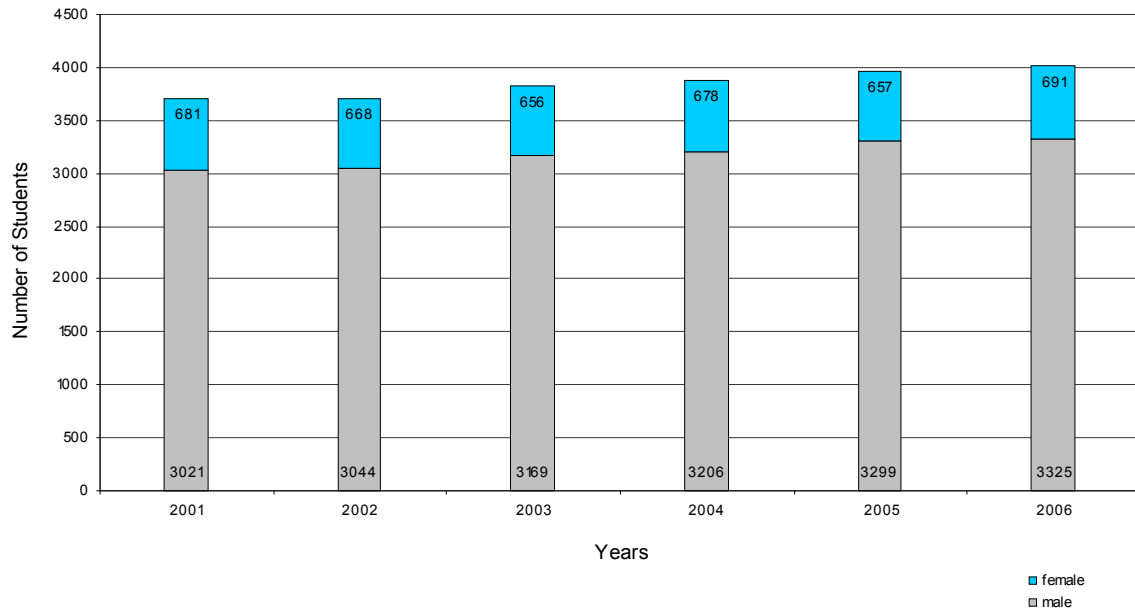
Figure 7: Gender of Construction students (Source: DEEWR)

2.3 How stakeholders influence construction education

There are numerous stakeholders in Construction education, including the professional institutions that accredit these degrees, the various sectors of the construction industry that employ graduates, the staff, the students and their families, as well as the learning communities students form. The role industry plays is particularly important, as Construction programs are vocationally oriented. Close links with the construction industry are clearly advantageous, and students are required to undertake periods of industrial experience as part of their studies (Indeed, most of the professional institutions that accredit Construction degrees prescribe this). The following section describes the professional bodies and highlights their impact on the disciplines.

2.3.1 The professional institutions

The professional bodies that support and accredit Construction disciplines benchmark degrees nationally and internationally, provide support for program issues and create links with industry professionals (Harvey, 2004). Their expertise and requirements have evolved slowly over time. It is noteworthy that over the past five years in Australia several new knowledge areas have been added to curricula in response to changing competencies, but little has been removed.

There are three main Australian bodies that accredit Construction programs - the Australian Institute of Building (AIB), the Australian Institute of Quantity Surveying (AIQS) and the Australian Institute of Building Surveying (AIBS). In addition, there are several other international professional bodies which many Australian universities seek accreditation from. These include the Chartered Institute of Building (CIOB) and the Royal Institute of Chartered Surveyors (RICS) as well as several others predominately throughout the Asia Pacific region, such as the Pacific Association of Quantity Surveyors (PAQS). Table 3 provides a snapshot of the institutions that have accredited Construction programs as at 2008.

Institution	AIB	AIQS	AIBS	RICS	SISV	Other
University of Technology, Sydney	●	●		●	●	CIOB, ISM, NZIQS, SIB, PAQS
The University of New South Wales	●	●		●		API
University of Western Sydney	●	●				
The University of Newcastle	●	●			●	CIOB
The University of Melbourne	●	●		●	●	API, BQSM, CIOB, HKIS, PAQS, BVAEAM
RMIT University	●	●		●		API
Deakin University	●	●		●		
Queensland University of Technology	●	●		●		BQSM
Central Queensland University	●		●			
Bond University				●		API
Curtin University	●	●		●		BQSM
University of South Australia	●	●	●	●	●	ACCE, HKIS, BQSM, CIOB

Legend:

ACCE	American Council for Construction Education
AIB	Australian Institute of Building
AIBS	AIBS Australian Institute of Building Surveyors
AIQS	Australian Institute of Quantity Surveyors
API	Australian Property Institute
BQSM	Board of Quantity Surveyors Malaysia
BVAEAM	Board of Valuers, Appraisers and Estate Agents, Malaysia
CIOB	Chartered Institute of Building
HKIS	Hong Kong Institute of Surveyors
ISM	Institute for Supply Management
NZIQS	New Zealand Institute of Quantity Surveyors
PAQS	Pacific Association of Quantity Surveyors
RICS	Royal Institution of Chartered Surveyors
SIB	Singapore Institute of Building
SISV	Singapore Institute of Surveyors and Valuers

Table 3: Accreditations of Construction degrees (2008) (Source: Heads at participating universities)

It should be noted that there is currently no legislative requirement for all practitioners to be members of professional institutions (in contrast to other professions such as engineering and architecture). AIB has lobbied for government legislation for AIB membership to be a prerequisite for a builder's licence, and AIQS has endeavoured to secure registered status for the quantity surveying profession. To date these attempts have been unsuccessful (By way of contrast, it is necessary to obtain formal accreditation and registration to practice as a building surveyor in Australia). These factors must influence the perceptions of students and industry members.

It is likely that, should AIB and AIQS succeed in changing legislative requirements, international bodies with a presence in Australia (e.g. RICS, CIOB and others) would be similarly empowered. Some of those consulted felt that this would undermine the need for Australian Universities to be accredited by AIB, AIQS and AIBS as illustrated in the following quote:

> *If the RICS and the CIOB achieve the same level as the local bodies (and their benchmarks are deemed to be at a higher level) what is the advantage of the Australian Universities bothering with the AIB, AIQS AIBS accreditation? It adds significantly to the costs of the university, is generally at a lower standard & each of them has a slightly different process. Why would a university bother to get those accreditations if, for example, having the RICS partnership recognises all three professions, is clearer & more precise about the expectations, has a clearly defined process and aims to increase standards?*

> *(Report Advice 29th March, 2009)*

These issues are clearly contentious. Whilst they are hypothetical, the challenges of changing legislation and the consequences that would arise warrant serious consideration by all stakeholders.

The following section provides brief details of these professional institutions.

The Australian Institute of Building (AIB)

Background

AIB was established in 1951 and issued with a Royal Charter in 1969 (AIB, 2004). It defines itself as an "association of building professionals, associate professionals and technicians engaged in building practice, teaching or research throughout Australia and overseas" (AIB, 2004). AIB sees itself as a regulator of policy debate and as an agent responsible for introducing changes to the "commercial, technical and regulatory environment in which building professionals work" (AIB, 2004). It accredits university programs having initially drawn its accreditation standards at Licentiate and Corporate grade after receiving its Royal charter. From this AIB has developed a course "assessment/qualification accreditation system (for Chartered [Corporate] Membership) 4 year full time (and the equivalent part time) bachelor degree programs" (AIB, 2004).

Mission statement

To be a leading institution for the building industry, benchmarking quality for education, setting standards and ethics and to be the voice of authority for future trends on behalf of professionals in the industry (AIB, 2004). AIB has the following objectives:

- to promote excellence in the construction of buildings and just and honourable practices in the conduct of business
- advance the study of building and all kindred matters, arts and sciences
- encourage the friendly exchange between members of knowledge in practical, technical and ethical subjects
- uphold the dignity of the profession of building and the status of the Institute

(AIB, 2004).

Grades of membership and admission requirements

AIB's current total membership is approximately 3,351 made up from Australia and overseas and covers all grades of membership. The grades consist of "Fellow, member, graduate, associate member, licentiate, affiliate and student" (AIB, 2004). The admission requirements for each of these grades depend on varied levels of academic and trade achievements and employment responsibilities. For example, to become a fellow a member must have an academic qualification at AQF level 7 or 8 and be a manager of an enterprise with occasional supervision.

Reciprocal arrangements with other professional institutions

AIB has close connections with the Royal Australian Institute of Architects (RAIA), the Institution of Engineers Australia (EA), Master Builders' Federation of Australia (MBFA) and the Building Diplomats Association of NSW (AIB, 2004). Some other alliances include the Australian Building Codes Board, various Construction Councils, Australian Construction Industry Forum, the NZ Institute of Building and the International Association for the Professional Management of Construction (IAPMC) (AIB, 2004).

The Australian Institute of Quantity Surveyors (AIQS)

Background

The AIQS is a national organisation with overseas membership. It is the "Australian peak body to the International Cost Engineering Council and the Pacific Association of Quantity Surveyors" (AIQS, 2008). The AIQS actively participates in "industry major forums and lobby groups" (AIQS, 2008). Furthermore, the AIQS contributes to research in industry through costing support and assists with all tertiary institutions on research projects (AIQS, 2008).

Mission statement

AIQS is the regulatory body of the quantity surveying profession. Through its leadership, standards and code of ethics, it ensures that practicing quantity surveyors are dedicated to maintaining the highest standards of professional excellence (AIQS, 2008). Its main functions are as follows:

- to ensure the necessary standards of education and training which lead to membership
- support the education of trainees
- encourage and provide continuing professional development
- maintain standards and methods of procedure
- uphold ethical standards of practice
- encourage and support appropriate research
- represent the profession at government, industry and public forums
- lobby for and encourage economic use of building and construction resources
- produce policies and position statements on professional and industry matters

(AIQS, 2008)

Grades of membership and admission requirements

AIQS requires members to have relevant educational qualifications and have "demonstrated the required level of professional competence after a statutory work experience period" (AIQS, 2008). Membership includes a 'Corporate' grade for those working as: "Quantity Surveyors, Building or Construction Economists, Cost Engineers, Cost Estimators and others with appropriate degree qualifications. Students . . . are eligible for non-corporate membership" (AIQS, 2008). There are two streams of membership—**Professional** and **Technical**.

Professional (Student, Probationer, Associate, Fellow):

AIQS offers free student membership to all students enrolled in an accredited degree program. On completion of their degree student members may be elevated to probationer membership and commence their APC (Assessment of Professional Competence). On completion of their APC and interview, probationers achieve associate (corporate) grade. Members can be elevated to fellow (if they are at least

35 years old) following ten years of associate membership in good standing, and if they hold a senior professional position of responsibility.

Technical (Student, Technician, Affiliate):

Free student membership is offered to students enrolled in an accredited TAFE program. On completion of their TAFE studies and when employed in the quantity surveying profession, student members can be transferred to technician grade. They then advance to affiliate membership.

Number of members in each class of membership

Membership numbers as of October, 2008 are shown in Table 4.

Membership grade	Number of members
Associates	1469
Affiliates	173
Fellows	216
Hon. Fellows	2
Life Fellows	30
Probationers	866
Retired	118
Students	970
Technicians	35

Table 4: Composition of AIQS membership (Oct 2008) (Source: AIQS)

Reciprocal arrangements with other professional institutions

AIQS has official links with: "the Royal Institution of Chartered Surveyors (RICS), the New Zealand Institute of Quantity Surveyors (NZIQS), the Singapore Institute of Surveyors and Valuers (SISV), the International Cost Engineering Council (ICEC) and the Pacific Association of Quantity Surveyors (PAQS), the Institution of Surveyors, Malaysia (QS Division) (ISM), the Association of South African Quantity Surveyors (ASAQS), the Canadian Institute of Quantity Surveyors (CIQS), the Institute of Quantity Surveyors, Sri Lanka (IQSSL), the Hong Kong Institute of Surveyors (QS Division) (HKIS)" (AIQS, 2008).

The Australian Institute of Building Surveyors (AIBS)

Background

Building surveyors are responsible for all aspects of ensuring that buildings are safe. "They evaluate and assess plans, conduct inspections and issue building permits" (AIBS, 2008). The AIBS "serves the community, the building surveying profession and the needs of individual Members" (AIBS, 2008). On the national stage, the AIBS "has a strategic role in representing Members, promoting the profession and providing a range of Member services". These services include: conferences, training seminars and continuing professional development courses (AIBS, 2008). The AIBS also accredits "the educational qualifications, experience and commitment to CPD of Building Surveyors" (AIBS, 2008).

Mission statement

The AIBS is the top professional body acting for building surveyors in Australia (AIBS, 2008). Its mission is to "promote and develop the professional standing of Members, while contributing to health, safety and amenity of the built environment" (AIBS, 2008).

Grades of membership and admission requirements

Full members have an approved qualification in building surveying. International members hold a prescribed/recognised qualification allowing practice in their country of origin. Affiliate members have an interest in the profession of building surveying. Student members must be undertaking a full-time program of study approved by AIBS and leading to a qualification in the profession of building surveying. Student member fellows hold an approved qualification in building surveying, have ten years continuous membership in AIBS, actively participate in some manner in promoting the aims and objectives of the AIBS and meet certain other requirements. Life members and life fellows have rendered a significant contribution to AIBS.

Number of members in each class of membership

Membership numbers as of March, 2009 are shown in Table 5.

Description	QLD	NSW	VIC	TAS	SA	WA	Total
Life Member		6					6
Life Fellow	4		9		7	6	26
Fellow	5	3	38		4	7	57
Member	434	577	483		180	139	1,813
Affiliate, Subscription and Corporate	18	33	23		6	1	81
Part-time Students	34	23	38		10	12	117
International		28					28
Full-time Students		8	53		3		64
Retired	27	42	13		14	8	104
Total	**522**	**720**	**657**	**-**	**224**	**173**	**2,296**

NOTE

QLD includes NT

NSW includes ACT

Table 5: Composition of AIBS membership (March 2009) (Source: AIBS)

Reciprocal arrangements with other professional institutions

AIBS is an active member of industry committees including: the Australian Building Codes Board (ABCB), Building Codes Committee (BCC) Building Access Policy Committee (BAPC) and Development Assessment Forum. These industry connections allow the Institution to successfully manage industry issues as they occur (AIBS, 2008).

The Chartered Institute of Building Australasia (CIOB)

Background

CIOB is an international institution of building professionals and has a "track record extending over 170 years of developing and promoting standards in education and industry" (CIOB, 2008). CIOB has extensive building and related resources which "enable members to benefit from a knowledge transfer available through global professional networks devoted to improving standards to 'world's best practice'" (CIOB, 2008).

Mission Statement

"The CIOB is committed to raising professional standards and practice in construction for the public benefit, to working with governments, clients and industry" (CIOB, 2008).

Grades of membership and admission requirements

Student members must be at least 16 years of age and have been accepted for or engaged in a construction-related program of study. Associate members are those with Australian Quality Framework (AQF) IV with a minimum of two years experience at higher technician level. Incorporate members are graduates with a CIOB recognised degree, AQF Diploma with a minimum of two years experience at higher technical level. Chartered members are individuals who hold a recognised degree and have a minimum of three years professional level experience in construction. Fellows are those members with at least five years experience at a senior level in the industry. In addition, the following membership routes are also available: Non cognate members are persons who are working in construction but who have gained their degree in another discipline or hold qualifications not currently recognised by the CIOB. Experienced Practitioners are those who do not hold a degree but have at least five years professional experience in construction. Chartered Environmentalist—qualifications are available for MCIOB and FCIOB members working in the area of sustainability.

Number of members in each class of membership

The CIOB has membership of approximately 43,000 in over 100 countries (CIOB, 2008). CIOB has offices in Europe, Africa, Malaysia, Singapore, China, Australia and member centres in North America, the UAE and India (CIOB, 2008).

Reciprocal arrangements with other professional institutions

CIOB has reciprocal arrangements with other National Institutes in Australia, USA, China and Hong Kong and in countries within the European Union (CIOB, 2008).

The Royal Institution of Chartered Surveyors (RICS)

Background

The RICS is an international body (although predominantly UK based) which "represents everything that is good in the property profession" and provides advice on "land, property, construction and related environmental issues" (RICS, 2004b). The key roles of RICS are to: regulate and promote the profession; maintain the highest educational and professional standards; protect clients and consumers through a strict code of ethics; and provide impartial advice, analysis and guidance (RICS, 2004b). RICS sets and regulates education and training standards for its members through "the accreditation of degrees, the assessment of graduate trainees, and through rules of conduct, ethics and bye-laws requiring continuing professional development, promotes the Chartered Surveyor qualification, standard and impartial services of its members globally, through the media, submissions to government, promotion to the public and industry" (RICS, 2004b).

Mission Statement

RICS is an "independent, non-profit making organisation committed to acting in the public interest and providing impartial, authoritative advice on major issues affecting business and society" related to quantity surveying (RICS, 2004b).

Grades of membership and admission requirements

RICS has two grades of membership for initial qualification—MRICS and TechRICS. The MRICS qualification requires a RICS accredited degree (or equivalent) and completion of a two-year period of structured and assessed employment (RICS, 2004b). The TechRICS qualification requires a relevant TAFE Diploma, and a two-year period of structured and assessed employment (RICS, 2004b). Furthermore, RICS members can qualify for membership in any of 17 distinct RICS 'faculties', these being "most areas of land, property and construction practice including: valuation, quantity surveying and construction, geomatics, rural, commercial property, environment, dispute resolution, facilities management, project management, building surveying, building control, minerals and waste management, planning and development, and residential property" (RICS, 2004b).

Number of members in each class of membership

RICS has "140,000 members globally and represents, regulates and promotes the work of land, property and construction professionals throughout 146 countries" (RICS, 2004b). Membership data are provided in Table 6.

Membership grade	Number of members
Fully qualified MRICS or FRICS members	100,000
Graduates undertaking their training to become MRICS	5,000
Student members	35,000
TechRICS members	3,000

Table 6: Composition of RICS membership (Source: RICS)

Reciprocal arrangements with other professional institutions

RICS operates out of 146 countries, supported by an extensive network of regional offices located in every continent around the world (RICS, 2004b). Many RICS members are members of national professional bodies and RICS has reciprocal and other preferential membership arrangements with many organisations globally. In Australia these include the AIQS and the Australian Property Institute.

2.3.2 Other characteristics of the professional institutions

In recent years there has been an increasing trend for Construction providers to seek accreditation from international professional institutions such as RICS and others (AIB, 2008b: News article) as illustrated in Table 3. As a consequence, the marketability of Construction programs is evolving. By securing overseas accreditation, construction programs are able to promote an international profile and encourage offshore employment and study opportunities for their students. These international openings anecdotally attract additional students and enhance industry's perceptions of these programs.

Notwithstanding the above, it is interesting to observe that industry, community and student perceptions of professional institutions appear to be ambivalent. This is in marked contrast to other parts of the world (e.g. Singapore, Malaysia, UK and Africa) where membership of a professional institution is aspired to and, in some cases, required as a licence to practice. Professional institutions operating in Australia face multiple challenges including a lack of appreciation amongst industry, students and academics of the value of membership of a professional institution. Warren and Wilkinson (2008) consider the challenges these bodies face and note students' perceptions that "as the professional bodies seek to become global organisations the need to attract new members is a quintessential element of the growth strategy. This rapid growth expectation, while being realised among established practitioners,

is not being so readily translated into student and early career professionals" (Clive Warren & Wilkinson, 2008:2).

Issues concerning the processes and demands of accreditation are explored further in Section 4.2.2.

2.3.3 The construction industry

Industry has a vested interest in Construction education as it employs graduates (and students) and makes demands of them (A. Mills & Ashford, 2004). There is an increased demand for graduates as insufficient numbers of students currently complete their degrees.

The construction industry is populated by professionals who take on a variety of roles and responsibilities (for example, as contractors, sub-contractors, suppliers, officers in local authorities and consultants to name a few). As previously mentioned, new models of construction practice have spawned specialized professions, requiring graduates with unique skills such as "lighting, acoustic, circulation, IT specialists..." (Cole, 2007:100). In a similar vein, additional management disciplines and positions are also emerging, highlighting the fact that the construction landscape is constantly in flux. A compounding factor has been a steady increase in the uptake of information technology (IT) by the construction industry. One application that is likely to have far-reaching impacts is that of Building Information Modelling (BIM) (Aranda-Mena, Chevez, Crawford, & Froese, 2008; Kajewski & Weippert, 2003; Stewart, 2000). Such innovations show that the construction industry has become globally mobile which has, in turn, had an impact on curricula. Additionally, growing industry demands for environmental, IT and management skills often far exceed the capacity of Construction curricula to accommodate them, leading to further fragmentation and overcrowding. Furthermore, industry has strong perceptions and demands about what university education should involve and this is frequently more practical than theoretical (Clive Warren et al., 2005). The industry landscape, perceptions and future demands for IT knowledge and skills have the potential to influence Construction curricula.   These factors and pressures define the gap that this research project has investigated.

2.3.4 Teaching and learning communities

Other stakeholders in Construction education are students, their peers, family, friends and partners. Their expectations, attitudes and values play an important part and need to be taken account of. Contemporary students appear to be motivated firstly to obtain a qualification but not necessarily an education (Sheahan, 2005). Current Construction students have different priorities to those of the past. For example, family, friends, leisure and employment may take precedence over education.   Furthermore, students are increasingly aware about their education rights.   Many consider the demands previously placed on students to be unreasonable (Ashford & Francis, 2007a).   In addition, the families (mostly parents) who support students have strong views about the outcomes of a university education.   They expect graduates to be employable, to have leadership potential in a range of fields, to possess a broad range of skills and to be flexible in applying their knowledge.   These expectations effectively make them "a major stakeholder in higher education" (Naylor, 2007:194).

Teaching and learning communities to which Construction staff belong also play a part in shaping Construction education.   They provide a forum where relevant matters can be discussed and debated. Furthermore, the activities which these organisations arrange are effective dissemination vehicles. Some of these communities are listed in Table 7.

Acronym	Organisation
AAEE	Australasian Association for Engineering Education http://www.aaee.com.au/
ASCILITE	Australian Society for Computers in Learning in Tertiary Education http://www.ascilite.org.au/
AUBEA	Australasian Universities Building Education Association http://www.aubea.org.au/
AVETRA	Australian Vocational Education and Training Research Association http://www.avetra.org.au/
BEAR	Building Education and Research Task group W89 of CIB (International Council for Research and Innovation in Building and Construction) http://www.cibworld.nl/website/
CEBE	The Centre for Education in the Built Environment http://www.cebe.heacademy.ac.uk/
CNBR	Co-operative Network Building Researchers http://tech.groups.yahoo.com/group/cnbr-l/
COBRA	The Construction and Building Research Conference of Royal Institute of Chartered Surveyors http://www.rics.org/NR/rdonlyres/5687B065-031B-426C-B19C-DD07097ECF55/0/418_CobraBrochureA5_AW_V1.pdf
ENGSC	Engineering Subject Centre http://www.engsc.ac.uk/
TL FORUM	Teaching and Learning Forum http://lsn.curtin.edu.au/tlf/tlf-pubs.html

Table 7: Sample of Construction teaching and learning communities

2.3.5 University authorities and structures

University structures also have an impact on Construction education. Australian universities are substantially federally funded and are responsible for teaching, learning and research. Whilst universities have become increasingly aware of commercial imperatives, their main operations are closely regulated by government policy. Indeed, universities in the last two decades have undergone major changes internationally and in Australia (Naylor, 2007). Decreasing resources have placed increased pressures on teaching. As a result universities have had to become increasingly accountable for their actions. In addition, there has been marked pressure on academics to conduct research and to monitor its significance (Kogan & Hanney, 2000). These relatively recent changes have had an impact on how these disciplines are administered (these are discussed further in later parts of this report).

Opportunities for Construction graduates are not restricted to Australia. There are employment opportunities all over the world, and many Construction professionals work abroad for periods. Clearly having an internationally recognised qualification assists Construction professionals obtain overseas employment. Accreditation by international bodies such as CIOB, RICS, SISV and others is therefore attractive to universities as a means of marketing their degrees. Unlike engineering degrees (which are internationally recognised under the Washington Accord – see http://www.washingtonaccord.org/) Construction degree programs need to seek recognition from numerous professional institutions. This is an onerous and costly process which intensifies the financial pressures felt elsewhere within universities.

The sometimes conflicting expectations and requirements of the stakeholder groups discussed above have had a considerable impact on Construction education over the past six years. None of these expectations are unreasonable in isolation, but collectively they place Construction education in a difficult position. Any alignment or reduction of stakeholders' expectations would improve the situation. However, over the last few years some of the positions of these stakeholders appear to have become increasingly entrenched. Most appear

to agree that Construction education is under enormous pressure and that changes to accreditation practices are needed. However, in taking up inflexible positions some stakeholders have impeded the changes necessary to make progress. Another solution might be to increase the level of financial support to schools of Construction, thereby enabling the disciplines to meet these needs. However, without federal or external intervention this support seems unlikely. These pressures are explored in depth in the following chapters.

2.4 Conclusion

Exchanges with more than 100 Construction academics at all levels has indicated agreement that Construction education is under enormous pressure. Maintaining a base level of educational outcomes is seen as all that is possible in the current climate, although a much smaller number of academics see opportunities.

This chapter has:

- briefly considered literature on Construction education
- established the gap in the literature which this report addresses
- recorded the current state of Construction programs, staffing and student trends
- identified issues and opportunities for the disciplines
- outlined important stakeholders who influence the Construction programs, including the institutions that accredit these programs, the construction industry, teaching and learning communities and university authorities and structures

The methodology used to collect the information in this report is outlined in the following chapter.

3. RESEARCH METHODOLOGY

This chapter provides details of the approaches used in this study of Construction education. The methodology chosen needed to address the research aim, which was *to develop an understanding of the key curriculum, teaching and instructional challenges facing the Construction disciplines across Australia*. It was necessary to examine the historical state of Construction education, as well as current issues and opportunities that may arise in future. These required the collection and analysis of quantitative as well as qualitative data. The project team commenced with a review of relevant literature. An on-line survey was then administered to academics who teach Construction students. Historical data sourced from university websites as well as from government archives and websites were then collected to obtain an overview of the state of the curricula and other relevant issues. The final stage established the views of academics and students within the disciplines through interviews and focus groups. Collectively these data (both quantitative and qualitative) were interpreted and analysed. This chapter describes these methods in detail.

3.1 Background

An empirical investigation of Construction education was conducted to address the objectives of this study. Twelve Australian Universities (see Table 8) were investigated to identify and understand the issues which promote and limit the effectiveness of teaching and learning in these disciplines.

State	Institution	On campus	Distance Learning
NSW	The University of Newcastle (UN)	✓	
	The University of New South Wales (UNSW)	✓	
	University of Technology, Sydney (UTS)	✓	
	University of Western of Sydney (UWS)	✓	✓
Queensland	Bond University (Bond)	✓	
	Central Queensland University (CQU)		✓
	Queensland University of Technology (QUT)	✓	
South Australia	University of South Australia (UNISA)	✓	
Victoria	Deakin University (Deakin)	✓	
	RMIT University (RMIT)	✓	
	The University of Melbourne (UM)	✓	
Western Australia	Curtin University of Technology (CUT)	✓	

Table 8: Providers of Australian Construction degrees and delivery modes (Source: University websites)

The investigation concentrated on longitudinal trends over the past six years as well as on current issues and opportunities. It focused on pre-professional undergraduate programs, accredited by professional institutions for the construction industry.

The longitudinal timeframe (2001–2007) was chosen for pragmatic reasons. In the first instance, there is a paucity of accessible data prior to this period. Secondly, several significant events have occurred over the past six years that make this period significant for Construction education. For example:

- there have been major structural changes at many Australian universities and these have had an impact on the disciplines

- numerous societal and technological changes occurred which have required timely responses—these are illustrated by moves to an 'information society' which have necessitated changes to university policies and created increased financial pressures for all stakeholders

- Government-imposed budget constraints have prompted some institutions to increase their recruitment of full-fee paying international students and have also resulted in compulsory student union membership being abolished

Universities have responded to these challenges in numerous ways including broadening their profile and expanding the range of programs on offer. An extensive range is currently available with opportunities for students to enrol in combined or double degrees.

The period studied is therefore brief in the context of the time that these programs have been operating. However it captures the impact of events that have changed traditional notions of university education, and provides a clear indication of the directions these disciplines are likely to take in the immediate and long term. University education is no longer seen as a privilege—it is now regarded as being for everyone (Star & Hammer, 2008).

It is worth reflecting on the ways some Construction disciplines have reacted to these changes and some of the strategies that have been implemented. These include:

- re-badging programs to widen their appeal

- developing summer schools to fast-track students through their studies

- increasing the use of information technology to deliver courses to on-campus and distance learners simultaneously

- restructuring programs to meet the requirements of the Bologna model

These and other changes are explored further in this Chapter.

3.2 Exclusions

- **Sessional staff**

  At the outset of this study a decision was taken to focus on full-time academic staff. These academics are instrumental in shaping and driving educational courses and programs, whilst sessional (casual and/or part-time) staff are generally called on simply to teach. Furthermore, it was anticipated that the records for full-time staff would be readily accessible. Conversely it was noted that sessional staff are frequently difficult to identify and contact, and that their records might similarly be difficult to access. It is possible that restricting this study to full-time staff may have augmented the gender bias inherent amongst Construction academics. It is acknowledged that these staff play an important part in university education (Percy et al., 2008) and particularly in Construction disciplines. Future research into the issues relating to sessional staff is warranted.

- **Non academic staff**

  Similarly non-academic, administrative staff were not investigated in this study. They make significant contributions to these programs, but have no responsibility for the content, teaching practices, curricula and related teaching and learning matters.

- **First year students**

  As a significant number of first year Construction students are minors it was decided that those younger than 18 would be excluded from this study to simplify meeting the requirements of the National Statement on Ethical Conduct in Human Research (NHMRC., ARC., & AVCC., 2007). This is not to say that the experiences of these

students are unimportant. They present a range of unique challenges but these are outside the scope of this study.

3.3 Data collection and analysis

The study commenced with a literature review that informed the qualitative and quantitative investigations that ensued (see Figure 8). An overview of relevant literature is provided in Sections 2.1 to 2.2. The quantitative investigation relied on an analysis of data that were either in the public domain or that were gathered via an on-line survey. The qualitative aspect was based on data collected from the same on-line survey, as well as from face-to-face interviews and focus groups with academic staff and undergraduate students.   The triangulation inherent in this approach enabled robust conclusions to be drawn.   Data collection occurred in accordance with international standards of ethical human research (The University of Newcastle approval number H-2008-0042).

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┌─────────────────────────────────────────┐
│          Project Development             │
│   Literature Review, Project Team        │
│   Meetings, Steering Group Consultation  │
└─────────────────────────────────────────┘

┌──────────────────────┐  ┌──────────────────────┐
│ Quantitative Data    │  │ Qualitative Data     │
│ Online survey        │  │ Online survey        │
│ academics            │  │ academics            │
│ DEEWR                │  │ Staff interviews     │
│ AIQS course          │  │ Staff focus groups   │
│ guidelines           │  │ Student focus groups │
│ University website   │  │                      │
│ data                 │  │                      │
└──────────────────────┘  └──────────────────────┘

┌─────────────────────────────────────────┐
│   Data Production, Analysis, Findings    │
└─────────────────────────────────────────┘

┌─────────────────────────────────────────┐
│  Reporting and Identification of Future  │
│              Research                    │
└─────────────────────────────────────────┘
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Figure 8: Flowchart of research procedure

3.3.1 Quantitative Analysis

Initial investigations sought to identify existing information and current trends.   The Department of Employment, Education and Workplace Relations (DEEWR, formerly the Department of Education, Science and Training, DEST) provided data on students' enrolment patterns.   These were supplemented with tertiary course guides for the past six years, supplied by AIQS.   Attempts were made to access annual reports (which construction management and quantity surveying programs submit to AIB) for the period in question but AIB wished to respect the confidence they had assured the authors of these documents, and they were not made available to the research team.   Collectively these data facilitated an initial understanding of the trends, changes and developments that occurred over the past six years. It was possible to determine the size of student intakes for each year, the number of graduates and to identify changes to curricula. These data sets were managed in a Microsoft Access database and presented using Microsoft Excel.

University handbooks and websites proved to be challenging to analyse as most presented their data in a unique way, making direct comparisons difficult. The AIQS tertiary course guides provided some historical information about the courses each university program offered. All these data were categorised according to themes to facilitate later manipulation. It became apparent that some of the data contained in the AIQS handbooks were ambiguous. It was therefore decided to investigate related attributes of Construction programs. This included further analysis of data from university websites to track curricula and levels of current staff appointments. As some website information was presented in a manner that was difficult to interpret, some Construction departments were also approached to retrieve relevant course records.

As previously mentioned, it proved difficult to establish the population size of Construction academics. It was found that the 129 staff listed on Construction websites included those whose prime responsibility was in disciplines other than Construction. More Construction staff were identified through the on-line survey and this number was altered to 155. A further revision was necessary when clarification was obtained during face-to-face discussions with staff. The final population size was established to be 116 academics.

A small amount of quantitative data was also elicited using the on-line survey.

3.3.2 Qualitative Analysis

A two-stage approach was adopted for this part of the study. The first involved an on-line survey which was administered to full-time Construction teaching staff, and the second a series of interviews and focus groups with staff and students.

On-line survey

Full-time members of Construction staff were identified via university websites. A list was then sent to the head of these disciplines who confirmed that those noted were full-time, contract academics primarily responsible for teaching undergraduate Construction students.

An in-house on-line survey instrument was used to elicit data from this group of academics. The survey comprised approximately 40 questions and was piloted with staff in the School of Architecture and Built Environment at The University of Newcastle. Questions were asked relating to issues identified in the literature review as well as about aspects that arose during discussions with representatives from Construction professional bodies and members of the project steering committee. The Corporate Information division of The University of Newcastle administered the survey independently, assuring anonymity for the participants.

Academic staff were personally invited to participate in the on-line survey (which was expected to take less than 30 minutes to complete). Four subsequent emails were sent and 63 responses were received. A response rate of 54% was achieved (based on a revised population size of 116). Response rates for individual universities are provided in Table 9. Data were analysed in Microsoft Excel and QSR Nvivo (QSR, 2008).

Interviews and focus groups with Staff and Students

A preliminary analysis of the on-line survey data informed subsequent qualitative data collection. A set of open-ended questions were developed and used in a series of semi-structured interviews and focus groups. Heads of Schools/Departments and program coordinators/convenors of Construction disciplines were interviewed. Separate focus groups were held with academic staff and students. These were conducted at 11 Universities and were facilitated by members of the research team. One university was not able to participate in the interview process. The number of people interviewed, and their gender, is shown in Table 10.

State	Institution	Response Rate
NSW	The University of Newcastle (UN)	88%
	The University of New South Wales (UNSW)	36%
	University of Technology, Sydney (UTS)	32%
	University of Western Sydney (UWS)	26%
Queensland	Bond University (Bond)	33%
	Central Queensland University (CQU)	75%
	Queensland University of Technology (QUT)	42%
South Australia	University of South Australia (UNISA)	73%
Victoria	Deakin University (Deakin)	25%
	RMIT University (RMIT)	47%
	The University of Melbourne (UM)	18%
West Australia	Curtin University of Technology (CUT)	63%

Table 9: Survey response rate from Schools of Construction

Group	Male	Female	Total
Interviews with Heads of School and Program Coordinators	19	1	20
Staff focus group participants	28	2	30
Student focus group participants	79	7	86
TOTAL	126	10	136

Table 10: Number of participants in focus groups and interviews (Source: Consent forms)

Participation in the interviews and focus groups was voluntary. In total, 20 academic managers agreed to be interviewed and 30 staff and 86 students took part in the focus groups (see Table 10). Heads of school/department also participated in three of the staff focus groups. The students were from second year and above and there was an even distribution across cohorts. All interviews and focus groups took place between May and August 2008 (see Table 11).

Visit	Location	Date
1	University of South Australia	6th May
2	Curtin University of Technology	7th May
3	The University of Newcastle	7–10th May
4	Queensland University of Technology	12th May
5	Bond University	13th May
6 Tele-conference	Central Queensland University	15th May
7	RMIT University	27–28th May
8	Deakin University	29th May
9	University of Technology, Sydney	5th August
10	University of Western Sydney	6th August
11	The University of Melbourne	11–12th August

Table 11: Sequence and dates for the interviews and focus groups with staff and students nationwide

Purposive sampling (Rice & Ezzy, 1999) was used to identify participants and to develop the best combination of rich information for the aims of this study (Patton, 1990). Initial contact was made with academic staff by email and information statements on the project were distributed. Potential participants were invited to contact the project team if they wished to be involved and their participation was based on their informed consent.

To understand the key curriculum, teaching and instructional challenges facing the Construction disciplines across Australia, interviews with Construction heads / program coordinators were designed to allow the challenges initially identified in the online survey to be explored in more depth. While interview questions were structured, participants were also given opportunities to provide additional information on any of the issues raised. This ensured that a well-grounded understanding of the key challenges facing the disciplines was obtained. This interview technique was in keeping with recognised semi-structured qualitative approaches where "conventional wisdom in conducting qualitative research is to keep the approach flexible and open-ended to learn the meanings and views held by participants in a study" (Miller & Salkind, 2002:145). Open-ended prompts were integral to the interview process and ensured that participants had opportunities to explore new areas of discussion (Creswell, 2005). Each interview and focus group lasted approximately one hour and took place at a time and location convenient to the participant(s). All were assured of their confidentiality and anonymity and all signed consent forms. All discussions were recorded for transcription. Participants were invited to review their transcripts to delete and/or edit any information.

Full-time academic staff not interviewed were invited to participate in a focus group. They were sent an open invitation to attend a discussion about issues facing the disciplines. Similarly, students from second to fourth year were invited to a focus group by their heads / program coordinators.

When staff and students arrived for their respective focus groups they were provided with an information statement (see Appendix 2) and received a verbal explanation of what was expected and why the research was important. Staff and students were also informed that discussions were to be recorded and that their anonymity as well as that of their university would be protected. Staff and students were invited to fill out consent forms or to decline to participate. All who participated signed consent forms. They were then prompted through a series of semi-structured questions and asked to respond and discuss issues with their colleagues. Each focus group took up to an hour and a half to complete, and a consensus was generally reached. Both staff and students embraced the opportunity to participate.

The interview and focus group data were later explored in depth using qualitative data analysis procedures. Qualitative findings were used to support quantitative findings from the online survey, thereby providing robust triangulation of the analyses. The research approaches used were derived from interpretive ethnographic methodologies most commonly used in sociology and anthropology. As Denzin states, interpretive ethnography:

> *attempts to rescue the meanings, actions, and feelings that are present in an interaction experience [of the group studied, and] . . . captures the meanings persons bring to their experiences. (Denzin, 1997:159)*

Qualitative ethnography is concerned with capturing and understanding lived experiences including the perspectives, intentions and values of the subjects studied (Denzin, 1997). This makes ethnography highly appropriate for studying staff and student views on teaching and learning.

As is customary with interpretive ethnography (Denzin, 1997), the data were analysed by looking for recurring patterns of discussions in the transcripts and making what are termed "thick interpretations to reveal the conceptual structures that inform … subject's acts" (Geertz, 1973:27). These 'thick interpretations' are different to quantitative/statistical analyses as they create an in-depth understanding of the culture, beliefs and issues faced by the group(s) studied. Analysis of the data recorded during the interviews and focus groups was consistent with a grounded theory approach (Creswell, 2005). The audio recordings were transcribed, the resulting text was categorised and recurring themes were identified. This form of

interpretation and analysis is indicative of the second level analysis of grounded theory, where coding involves two ways of analyzing, one "the making of comparisons, the other the asking of questions" (Strauss & Corbin, 1990:62). Qualitative research does not have systemic procedures to test the data compared to quantitative, but other procedures can still be used, for example qualitative data bases (Miller & Salkind, 2002:145). QSR NVivo (QSR, 2008) was used in the analysis of the qualitative data. The transcriptions were imported into NVivo to allow thematic analyses to be conducted. Following standard qualitative data analysis guidelines, codes were developed as the themes emerged from the data. Codes are defined as nodes in NVivo and those developed for this study are shown in Table 12.

Primary Nodes	Secondary Nodes
Accreditation	Benchmarking
	Cumbersome
Curriculum	Discipline status
	Curriculum fragmented
	New program
Gender	
Industry	Industry experience
Staff Issues	Workload
	Promotion
	Recruitment issues
	Large classes
Students	Attributes of Generation Y (members of the population born between 1978 and 1994)
	Students working whilst studying
Teaching and Learning	Teaching versus research
	Practical experience
	Online learning
	Group work
	Face to face
	Assessment
University	Lack of resources
	Research
	Future change
	Playing the game

Table 12: Initial primary and secondary nodes (Source: NVivo database)

All discussions were categorised according to these nodes. These categorised data were then compared with the findings from the online survey and the literature review.

3.4 Response rates

Although the response rates for the qualitative investigations were relatively high and provided a good reflection of the issues currently facing the disciplines, it should be noted that more males than females participated in these studies (see Figure 4). This gender imbalance reflects existing trends for Construction teaching staff and students, and is an issue which is widely debated in literature (London, Gajendran, & Yun Loy, 2007). It is argued that women do not consider a career in the Construction disciplines as these are perceived to be male dominated (Francis, Kestle, Scofield, & Wilkinson, 2004). Further changes are required in the construction industry to inform policies and procedures to improve this gender imbalance

Approximately 35% of full-time Construction staff attended interviews and focus groups (although some department or school heads were not from these disciplines). However, qualitative research benefits from the in-depth opinions of a modest number of participants,

rather than from the superficial responses of many (Patton, 1990). A representative sample of staff and students from each of the 11 schools/departments offering Construction degrees were surveyed. These responses provided rich, in-depth data (Patton, 1990).

There were some limitations that arose during the project. Firstly, the multidisciplinary nature of the Construction programs created obstacles that proved challenging to overcome. University websites did not explicitly indicate weightings of the topics taught within courses/subjects, and this made it difficult to accurately map curricula. Consequently other means of obtaining these data were explored, as described in Section 3.3.

Furthermore, some schools/departments have developed curricula which straddle discipline content boundaries (see Chapter 4) with many first year courses being taught by disciplines such as property and law. This made it difficult to extract data for Construction students because, for example, a first year law class might be attended by students enrolled in degrees other than Construction. It was therefore not possible to make direct comparisons between the courses offered at different universities. The impact of the resulting paucity of data is referred to throughout the rest of the report.

3.5 Conclusion

This chapter has described the research methods used in this project. The pressures and opportunities facing the disciplines are explored in the following chapters. The next chapter details the degree programs that are offered to Construction students.

4. PROGRAMS

This chapter documents the challenges facing those delivering Construction degree programs. It first of all identifies pressures exerted on the programs by universities themselves and then describes constraints imposed on curricula by the accrediting professional institutions and industry. Finally it considers how these pressures influence teaching and learning.

4.1 University pressures

4.1.1 Fragmentation

As described in Chapter 2, Construction programs have their roots in other allied disciplines. This heritage has not been lost – indeed some argue that it constrains the evolution of these disciplines. The key point is that Construction degrees are generalist qualifications. They equip graduates with a breadth of knowledge, skills and appropriate attitudes for the construction industry, rather than detailed expertise in a narrow area, such as structural engineering or architecture. A construction manager, for example, is not taught how to calculate the sizes of steel reinforcing bars as an engineer would do. However, construction managers do need to be able to identify where major areas of stress are likely to occur and, in the context of this example, to expect to see such areas more heavily reinforced than others.

Such a generalist remit has inevitable consequences for the management of these programs. Not only are those responsible for delivering Construction courses likely to be dispersed in various discipline areas throughout universities (and in some cases in industry), there is likely to be a greater diversity of them compared to other degree programs. Who should teach such generalist courses? Should specialist construction staff be recruited (for example, to teach construction law) or should such courses be out-sourced to other academic units? These considerations make significant demands on how these disciplines are managed. Furthermore, it is not clear whether senior university managers appreciate and/or take account of such factors in the management of, organisation of or strategic planning for the disciplines. Responses from the online survey and discussions with staff and students revealed that these demands were a significant issue for the development of curricula and the scheduling of courses.

This generalist approach impacts students as well, since class sizes are likely to increase when students enrol in generic courses within other faculties. This is not necessarily a problem, as students may have increased flexibility to direct their academic careers paths. For example, one student commented on the role of technology as follows:

> It's a pretty big part . . . it depends on what you want to do because at the end of this [degree] you can do so many things. You can be a manager, you can do contracts, you can be a quantity surveyor, you can do this, you can do that—you can do anything. It's pretty incredible really.
>
> *(Student Focus Group, B3, 2008)*

Alternatively, a number of students complained that some courses were too generic and did not relate closely enough to their program. This was seen to be mainly due to classes being shared with students from other disciplines:

But it's not like we don't have enough people. That's the thing. We have 120 students or we had 120 students last year.

(Interviewee 1)

It would be about 100 now.

(Interviewee 2)

That's more than enough to fill up a lecture theatre so I don't understand why they couldn't just make something more specific for us. Like fair enough if we had 30 people doing our course you might not want to do a whole subject dedicated to us.

(Interviewee 1)

(Student Focus Group, K3, 2008)

The term 'fragmentation' can be used to describe the implications of delivering generalist degree programs. Construction curricula are comprised of many discrete and diverse subjects and, in such circumstances, it is possible for curricula to become a series of unconnected courses. In discussions and focus groups some academic staff were ambivalent about whether or not fragmentation was an issue for Construction programs. However, they agreed that this was a requirement of the industry.

[Accreditation bodies] all want a little bit of this and a little bit of quantity surveying and a little bit of that and all the rest of it and so, yeah, fragmented it might be but that's a requirement of the industry. It's that sort of industry.

(Interview, Head of School, F1, 2008)

Fragmentation may result in courses being delivered by other faculties / schools / departments but the perceived effect of this is varied. These courses are inevitably delivered to large student cohorts and this arguably results in the courses not being targeted to specific disciplines. This has knock-on effects for the practical delivery of the programs, as noted by a member of academic staff during an interview:

So it's kind of very hard to actually set a standard or have a consensus about what it should include. When they [all Universities] articulate credits they really struggle. The reason is there are some universities have too many courses from the other faculties as a core requirement.

(Interview, Course Coordinator A2, 2008)

This quote implies fragmentation may have negative effects upon student learning. It suggests that fragmentation compromises the consistency of program outcomes. This is apparent when core courses overlap disciplines making it difficult to define the requirements for each program. Indeed, subject areas for Construction programs are diverse, further compounding this issue. Figure 1 provides a snapshot of the courses offered in Construction programs in 2007. It identifies the weighting of subject areas (as a percentage) for each degree and highlights the diversity of content areas offered. The diverse nature of the curricula is readily apparent, reinforcing the observation that Construction curricula are fragmented.

It will also be noted from Figure 1 that the core content areas of Building Technology and Science, Management and Quantity Surveying all have a high profile. Some universities differed in this respect by integrating large components of content into Case Studies (utilising a Problem Based Learning curriculum) so specific content was not easily measurable. Apart from this anomaly there is consistency across the remaining programs. The subject areas

identified in Figure 1 provide what might be considered as the core of the Construction discipline areas, i.e. the components of the curricula which provide these programs with their "personality". What is significant is that the core content areas only account for approximately 50% of the curricula. The remaining components are those which are the most variable. This indicates the level of diversity (in content and underpinning ideologies) in the programs. This contributes to the concept of fragmentation. It is likely that many of the courses in the non-core area come from other disciplines such as economics, management, engineering, etc.

It is interesting to note here that there are also positive benefits for students studying with those from other disciplines. 'Fragmentation' can be viewed as a positive trait, and has been observed by other authors. Both Bullen & Davis (2003:v) and Quinlan et al. (2007) show in their studies on trials of interdisciplinary subjects that an increased practical knowledge of how disciplines operate in the real world was learnt by participating students, i.e. students learned how to deal with contractors, architects (Bullen & Davis, 2003) and design processes (Quinlan et al.).

Nevertheless, where disciplines are placed within university structures can create issues for the programs, as there is a tendency to integrate courses to effect efficiencies. This observation was made by several interviewees and is discussed in the next section.

4.1.2 Placement within university

Fragmentation of Construction disciplines was found to occur within various departments, schools, faculties or portfolios (nomenclature depending on individual universities). These disciplines rarely exist in isolation, often being twined with others, some related to construction and some not. Interviews with staff indicated that the nature and pedigree of these partners has a marked affect on the way Construction disciplines are viewed by academics and by administrators. The following excerpts are indicative of this issue:

> *My Colleague has got up. . . in these restructuring meetings and he says "Construction is different to engineering" and you get some guy who is a psychologist who thinks "Engineering, construction yep they do the same thing" . . . and that's it, based on his crude understanding they're essentially two parts of the same process . . . They must be placed together. Whereas an actual synergy in industry is not engineering and construction management, it's engineering and property.*

> *(Staff Focus Group, K2, 2008)*

> *But it's, I think, driven by the fact that where, well we're located in the College of X because (discipline) X does have and has for a long time had a traditional career path which includes PhD. And they also have alot more journals and alot more opportunities in order to publish.*

> *(Interview with Head of Programs, K4, 2008)*

These quotes represent the reactions of Construction staff to programs being placed in (sometimes) multi-disciplinary faculties. Some academics are critical of unrelated disciplines being grouped together. They argue that there is a tendency for the distinctiveness and identity of disciplines to be diluted. It is also interesting to consider the quotes above in the context of two Construction disciplines at different universities, both situated in faculties which include high profile non-Construction disciplines. In one faculty (A) the non-Construction disciplines are experiencing buoyant student recruitment, whilst in the other (B) non-Construction recruitment is stagnant. Construction disciplines in Faculty A have been constrained in various ways (e.g. restricted student admissions and consequent curtailing of budgets) despite the fact that their degree programs are popular and recruit well. Conversely, the Construction discipline in Faculty B has been able to admit more students and has

increased its profile. Clearly the positioning of Construction disciplines within university structures can have a profound impact on the way such disciplines are perceived, funded and administered.

Figure 2 illustrates changes in subjects that have occurred as a result of increased amalgamation of programs. It provides an example of how certain areas of the curricula have increased (e.g. property, and economics finance and law) whilst others have decreased (quantity surveying, building technology and science, communication and documentation, practical work experience) over the past six years. These changes relate to internal and external factors. External factors relate to specific requirements from industry whilst internal factors (those within university structures) relate to how these subject areas have evolved.

Construction disciplines have found themselves working alongside academics and students from unrelated fields (including industrial design, health and science, psychology and social work) which has had varied consequences. There have been increases in subjects (such as property, and economics finance and law) to accommodate students taking on courses within these fields. In some cases synergies with more construction-related disciplines have been lost. For example, staff from one university felt that their discipline should have been located within "Business" but instead found themselves with "Health and Science".

Participants in this study confirmed that Construction units are not always optimally placed within university structures. The following quote from an interview is an example of how some staff view this situation:

> *. . . it's like the schools of architecture that used to run our courses. And now engineering is sort of taking over . . . And to even have us under a school of architecture . . . it's a total . . . disaster . . .a total disregard for construction management . . .*

> *(Staff Focus Group, K2, 2008)*

It is interesting to review the primary qualifications of academic staff in this connection. Figure 9 indicates these qualifications (by academic level) in 2008. It is significant that the professors have fewer construction qualifications (19%) than the other positions (approximately 24-30%). Having such a high proportion of non-Construction professors managing Construction programs suggests that the specific traits of these disciplines may not be implicit at this upper management level. Also interesting is the profile of law which is consistent at both professor and lecturer level but which is unrepresented at the intermediate levels. The reason for this may be that the status of professor and the requirements of research leadership to attain this level are more likely to be attained by academics with a research background in domains other than Construction. The implication of this is that Construction research is not being conducted at a high level. As a consequence, fewer Construction academics are eligible to take on leadership roles.
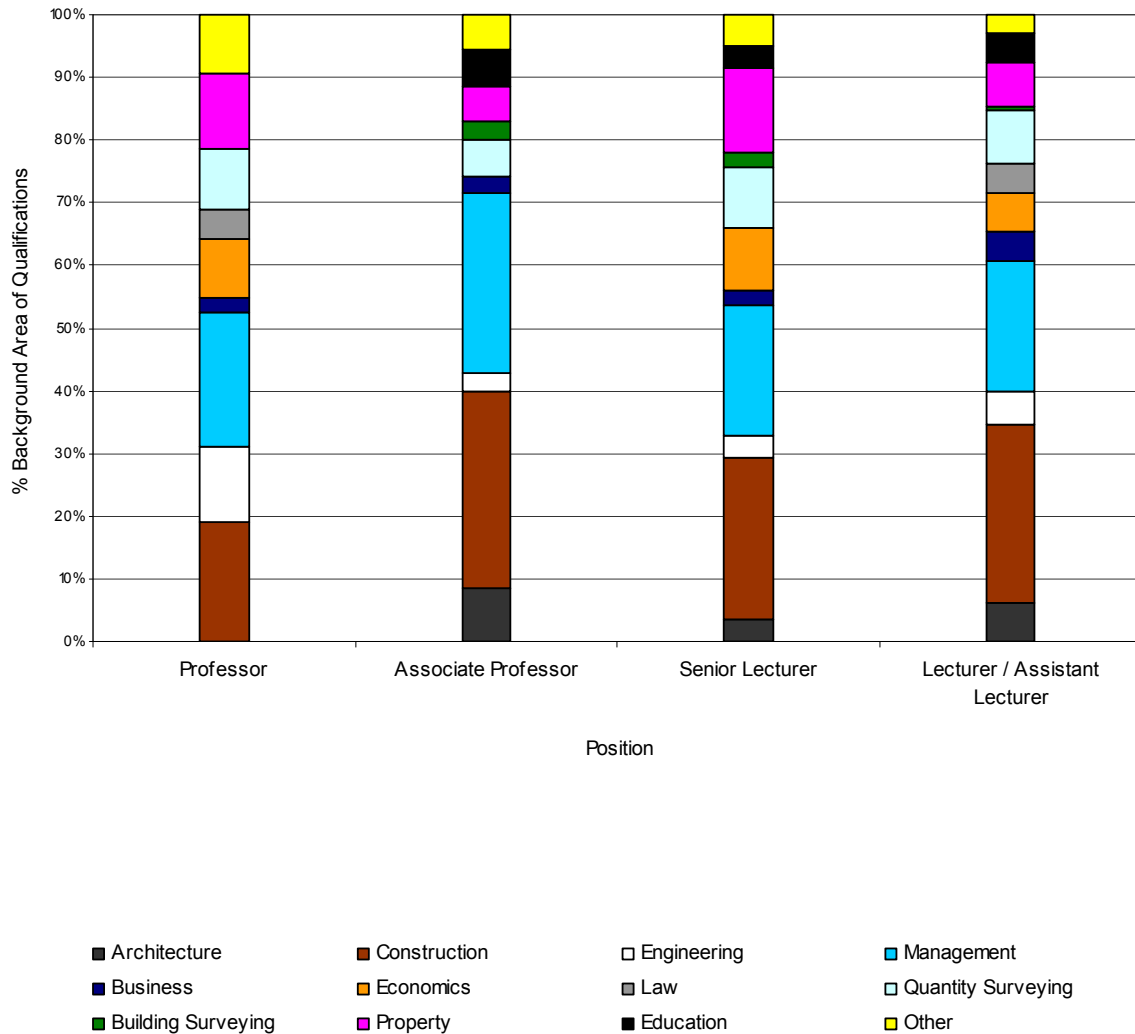
Figure 9: Qualifications of Construction academic staff, March 2008 (Source: University websites)

These results reflect other wider changes within university structures. For instance, over the past six years, a nation-wide trend has been for Australian universities to amalgamate academic disciplines into large units (e.g. faculties, portfolios etc.) for managerial, administrative and governance reasons (such as changes to funding and the introduction of the 'Bologna Model' *(an innovative unitary degree system adapted from Europe)* (Ashford & Francis, 2007a; Heathcote, 2007; Rosenbaum et al., 2001).

Furthermore, controversy with respect to the placement of Construction units within faculties/schools is not unique to Australia. According to Roe (2002), the Constructiondisciplines in the USA are increasingly management/business orientated. Construction education "remains a discipline in search of its identity" and continues to be taught "within umbrellas of engineering or architecture departments that may seem unlikely" (Roe 2002, 55). Roe observes that the disciplines still lack respect within university structures and are seen as a stepping stone into older disciplines such as engineering and architecture.

This discussion has shown that Construction staff are concerned about how and where their disciplines fit into their universities. It is evident that there may be tensions between older established disciplines and the newer Construction disciplines, and that Construction is widely considered to attract less status. This lack of status has far-reaching implications including research profile, leadership profile and teaching loads. These are discussed in the next section.

4.1.3 Discipline status

A consistent theme developed during interviews and focus groups was that Constructiondisciplines are perceived as less well respected (and are therefore considered by some to be of lower status) than more traditional disciplines such as architecture and engineering. One participant noted that:

> *We're not recognised, accorded the same recognition because it's a relatively young profession. It's not really well known and it covers . . . quite a wide variety of careers. Quantity surveying is understood as a career, construction management isn't necessarily; facility management is almost unheard of, and yet they're all professions that our program . . . feeds graduates into.*
>
> *(Interview Head of Programs, A1, 2008)*

The perspective represented above shows that Construction disciplines are not held in the same regard as some other disciplines. This is partially due to a lack of appreciation of the professions graduates are employed in, and partially because Construction disciplines do not have a longstanding tradition at universities. An alternative perspective (presented in the quote below) is that the professional bodies that accredit Construction programs want these programs to have the same profile as traditional (engineering) disciplines:

> *It is interesting, I have been around long enough to know why they want four year courses and it goes back to wanting to be like an engineer[-ing program] and they do not want to be like a business [program]. They want to be a hard, tough, detailed engineering type program and that is the whole basis. But actually a lot of construction management is business.*
>
> *(Staff Focus Group, G2, 2008)*

This highlights the view held by some Construction academics that these disciplines are more like a management or business program than an engineering or architecture program. A corollary to this argument is that Construction program structures do not align with the real needs of the industry. It should be stated that this view was not held by the majority of those consulted or by the Construction professional bodies. However, it needs to be taken into consideration when looking to the future of the discipline.

The lack of perceived status of Construction programs is not restricted to university employees, as the general public appears to hold similar views (Martin, 2007). Here it is interesting to draw parallels to the engineering profession. The recent ALTC report *Addressing the supply and quality of engineering graduates for the new century* has as its first recommendation that "the public perception of engineering" is targeted by "(raising) the public perception of engineering, including within primary and secondary schools, by increasing the visibility of the innovative and creative nature of engineering and the range of engineering occupations that contribute to Australia's prosperity, security, heath and environment" (King, 2008:102). It is clearly the case that Construction professions are not the only ones that suffer from this lack of public status.

In a similar vein, another participant commented on the lack of status of the quantity surveying profession in Australia, compared to the UK, Hong Kong and Singapore.

> *I think it's been a difficulty in Australia to get that recognition for the name Quantity Surveyor and perhaps it hasn't been so bad in the UK or even in Hong Kong or Singapore.*
>
> *(Staff Focus Group, D2, 2008)*

It is interesting to compare local and international perceptions of the Construction Professions. This is concerning, as the status attached to membership of professional institutions in Australia appears to be lower than in other regions such as Asia or the UK.

Literature and media reports also indicate that the general public has little understanding of what construction management and quantity surveying entail as careers. The following quote emphasises this point:

> We did have problems a few years back as well. People had the perception if their kids finished the course they were going to be bricklayers or something. There were those issues, so they are not quite sure what it (CM) is.
>
> (Staff Focus Group, D2, 2008)

This statement highlights the general public's view of construction professions. This is despite the fact that the median salary paid to Construction graduates is noticeably more than engineering or architecture graduates receive (Martin, 2007). Dainty and Edwards (2003) argue that there is a crisis in recruiting building students in the UK whilst, at the same time, a shortage of skilled personnel exists. They contend that this is due to the low profile of the industry. However, Skitmore (1991) challenges and tests these 'folklore' perceptions, stating that they do not necessarily reflect reality and depend on external factors such as people's education background, gender and existing knowledge of the industry.

The fact that this issue has been explored extensively before and is emerging again in this study suggests that it is a significant problem. It is being slowly addressed by the Australian government and universities through advertising programs (Martin, 2007). The outcomes of these initiatives need further exploration.

4.1.4 Lack of awareness of Construction programs

There has been a slow increase in student enrolments in all three of the disciplines nationwide over the past six years (see Figure 6). This increase suggests that students have changed their views of Construction as a career path. Indeed some students in the focus groups discussed discovering these disciplines and changing from engineering/architecture to Construction. It is significant that Construction disciplines enrol a large number of students from other programs as well as from the TAFE sector. This gives these programs a different profile from those traditionally offered at universities. For example, at The University of Newcastle the percentage of students entering Construction programs from TAFE or from other programs can be as high as 50% in any one year.

There are other factors that also explain this increase in student numbers. More international students have enrolled and school leavers are increasingly choosing university education over other career paths (Kogan & Hanney, 2000). There is also anecdotal evidence of a gradual increase in students' and the general public's awareness of these disciplines. However, this has led some to the view that Construction disciplines are vocationally orientated and ought to be taught at TAFE rather than at university. This was the subject of some debate with academic staff during the interviews and focus groups, where it was suggested that such views undermine the status of the disciplines. Staff observed that the Construction industry was putting pressure on program providers to deliver more practically orientated courses (such as "measurement") that could possibly be taught at TAFE. They argued that some industry practitioners had unrealistic expectations of university education. University graduates are not intended to be able to conduct themselves as fully-fledged professionals immediately after they graduate. They require a period working in industry to allow them to develop – a situation recognised by many larger construction contractors who offer graduate training programs to new graduates. Such periods of professional apprenticeship are

advocated by the professional institutions, many of whom require Construction graduates to acquire industry experience before being eligible to apply for corporate membership.

It is interesting to compare this finding with literature on student's perceptions of these disciplines. Some authors note students' lack of awareness of Construction as a career path, in particular the quantity surveying and building surveying disciplines (Clive Warren et al., 2005). To address this the quantity surveying profession has attempted to raise its profile through advertising articles in the career sections of the Sydney Morning Herald and the Australian (Martin, 2007). Similar advertorials have been posted about construction management. It would appear that these disciplines suffer from a poor profile similar to that of engineering. However, Construction does not seem to have suffered the same drop in enrolments as engineering. Construction disciplines have actually grown in comparison to national trends for engineering (See Heathcote (2007) for a discussion on the growth of the Construction disciplines).

The professional institutions that accredit Construction programs are continually refining the topics and competencies that Construction programs are required to deliver. These changes respond to the requirements of industry. The next section describes the main pressures which industry requires Construction programs to accommodate.

4.2 Industry pressures

This study has shown that considerable pressure is being applied by the construction industry and its professional bodies to the curricula, design and structure of Construction programs. Industry preferences are for university programs that are more akin to TAFE and provide a skills-oriented curriculum including increased periods of practical experience. This suggests that there are disparities between the knowledge students gain from a university education and the knowledge and requirements industry practitioners desire from graduates.

4.2.1 Vocationally oriented programs

As mentioned above, industry and universities appear to have different ideological objectives for university level Construction education. This was apparent from the online survey where staff observed that, in their view, industry prefers 'technical' and 'practical' over 'theoretical'. There are various factors which influence these opinions. One perspective is that industry is influenced by the current skills shortage and takes a short-term view when employing university graduates. The proponents of this view acknowledge that it might take some time for these graduates to become fully productive, but argue that university education is designed to equip students with vision and leadership potential. The following quotation endorses this view:

> Industry knows what the universities produce in the building line of things and in the quantity surveying line of things. They know that they're going to have to put a bit of time into a student particularly in the year out and perhaps shortly after they graduate. But they're not going to have to put much time into it. And that's what, you know, internships are for before you can earn your professional qualification. Because it is expected that the firm will put some time into training you up, at least in the way they do things and you hope other things brush off along the way. That's all part of the education. I would hate it, and I think the university would too, if we were sending people out who were going to be the perfect practitioner this year but they've been so busy sort of measuring bills of quantities or whatever at the university that they'd never look around to see well where is this quantity surveying going? If we'd done that, all of our graduates would be redundant now because there aren't any bills any more, well very few. So what you're really talking about is giving people an opportunity to think

but in a certain context. That's really what our course is about I think, or the vocational ones that we're operating in anyway, the professional courses.

(Interview, Head of School, F1, 2008)

As noted above, graduates need to acquire industry experience to fully exploit the knowledge, skills and attitudes they have gained at university. A counter-argument is that university curricula do not relate to current conditions, and that university graduates are ill-equipped for the world of work.

A student in one of the focus groups stated they were learning an innovative IT program from their full-time industry employment. This student suggested that it would have been good if this program was taught in their degree. Hagar, Garrick, Melville and Crowley (2001) confirm this trend by stating that the construction industry has become increasingly IT sophisticated and competitive locally and globally (1990-2000) and that this has resulted in new skills being required of graduates. This calls into question whether Construction students are currently receiving appropriate exposure to current IT applications and technology.

During interviews a number of academic staff suggested that "industry may not necessarily want students who are innovative thinkers" and would prefer graduates with solid technical skills. The following excerpts illustrate this point:

And maybe that's being driven by the industry. I get a strong sense that the industry itself is keen to 'dumb down' the profession and I have no idea why.

(Interview, Head of Programs, A1, 2008)

(At a meeting with Professional Bodies and Industry) I asked the question "If faced with a choice to employ a highly technical competent person who was not very smart or employing someone who had a lot of vision and motivation and lots of capacity but did not know anything about measurement or construction—which one would you employ?" What do you think they said? 90% of them said one thing. They want the technical person who can do their job and leave the thinking to (them). And I was astounded by that. It makes you think that construction management, quantity surveying, building surveying should be embedded in TAFE when I hear things like that. That is what the profession wants.

(Staff Focus Group, G2, 2008)

The X and Y [accreditors] are myopic in their outlook in CM education. Get rid of measurement. It's a technical skill and can be learned in TAFE.

(Online Survey Response, 2008)

Also of concern to some academics was the direction being advocated for quantity surveying education. There is a perception that AIQS wants to ". . . have QS programs that are focused on measurement". This is worrying to some university educators because Construction degrees are generalist (servicing, as mentioned already, the professions of construction management, quantity surveying and building surveying). Targeting quantity surveying as a discrete profession would be difficult because the numbers of students choosing quantity surveying direct from high school are unlikely to be sufficient to support a stand alone degree).

This highlights tensions between the roles of universities and TAFEs. Some observe that AIQS is calling for training (predominantly in measurement). This is aptly summarised in the following quote:

51

What is the role of the university? What about industry . . . should it not play a role in the education of the graduates from the university i.e. the uni gives the graduates the tools and the industry teaches them how to use those tools? Should a uni graduate be "able to make a profit for their employer" upon graduation? Is the AIQS heading towards a TAFE mentality? If so, why not go to TAFE?

(Report Advice 29th March,, 2009)

The gap between curricula and industry experience is discussed by Star and Hammer (2008) who question the factors that influence 'skills-based pedagogy' (such as student behaviour and university changes). They conclude by promoting work integrated learning as a solution to this issue (Star & Hammer, 2008). Interestingly, a UK study on vocational higher education in construction and engineering reported similar findings to the research in this report. They recommend that "[E]ducational providers need greater knowledge of employer needs for associate professional/higher technician skills in their locality and business sector, and (should) engage with employers to ensure provision meets their needs" (Little et al., 2003:16). There is thus some disagreement on these issues, but to what extent is unclear. Notwithstanding these differences, few Construction graduates experience trouble finding employment in industry.

This section has summarised views expressed about practical aspects of Construction programs. There are concerns about the curricula, and about industry's perception of university education. There is also concern about whether universities should train or educate Construction students. This leads into the following section which discusses how industry's views and priorities are embedded in the accreditation requirements of these programs.

4.2.2 Accreditation

Whilst it is the role of professional bodies to monitor and comment on program content and delivery, many universities were concerned about aspects of Construction accreditation processes as they are currently conducted. Some students and industry practitioners set this in a context where the raison d'être of these institutions is questioned. Few students acknowledge the importance of being a member of a professional institution, and few become members (either as students or on graduation) (It is interesting to note that Warren and Wilkinson (2008) found a similar phenomena in their study and highlighted the difficulties of attracting graduates to take up membership of professional institutions). Similarly industry's view of several of these institutions is lukewarm. There is currently no requirement for Construction graduates to be members of professional institutions in order to practice (in contrast to other professions such as engineering and architecture). Warren and Wilkinson (2008) found a similar phenomena in their study and highlighted the difficulties of attracting graduates to take up membership of professional institutions.

Respondents to the online survey identified significant issues with the accreditation process, primarily with the accrediting bodies:

- These were seen as not always being up to date with industry
- It was observed that they had the power to make rules for university programs which sometimes stifle innovation
- There was anecdotal evidence which indicated that accreditation processes were inconsistently implemented between institutions
- The accrediting bodies require students to engage in industry-based activities and practices (like site visits) but do not assist in facilitating these; staff were of the opinion that more could be done to assist in this regard

- Construction programs are eligible for accreditation from numerous bodies (see Table 3). During interviews and focus groups it became apparent that some universities apply for accreditation from up to eight professional institutions. As a consequence, the workload involved in meeting the accreditation requirements of these bodies is onerous and costly. Those surveyed argued for the accreditation processes to be streamlined.

It was suggested that the time-consuming process of redesigning courses to suit accrediting bodies' requirements could be a benign procedure if it does not match industry requirements or expectations.

The following statement highlights this power relationship and corroborates the view stated above that accrediting bodies do not encourage innovation within curricula:

One of the things though that came through from the previous accreditation was that they (the professional bodies) very definitely want to discourage innovation. They want us to stand still and not to change our programs. I find that very strange. I suppose it gives them more scope to employ TAFE to fill in more gaps.

(Interview, Head of Programs, A1, 2008)

This quote highlights the perception of some academics that the accrediting bodies have a hidden agenda—that of discouraging innovation. This comment shows that the accreditation process could create a power struggle between those in authority (the accrediting bodies) and those being judged (academics). Harvey (2004) discusses this in his study on academics' views of accreditation in the UK and North America. He states that: ". . . Accreditation is just one of a raft of ongoing processes that demand accountability and compliance as managerialism continues to bite into academic autonomy and undermine the skills and experience of educators. Accreditation is yet another layer alongside assessment, audit and other forms of standards and output monitoring." (Harvey, 2004:221). Interestingly, Harvey (2004) also found that the interviewees in his study discussed underlying agendas and self interests of professional bodies. He states that along with supporting the interests of the university there is a view that "the professional . . . body represents its own self-interest: the organisations act to maintain their own privileged and powerful position as a controlling body. This is where control legitimated by public interest becomes confounded by control based on self-interest" (Harvey, 2004:212). At the same time Harvey states that this bureaucracy in relation to issues with program delivery is also about "contested control and consequent inhibition of innovation [and that] bureaucracy is as much about synchronicity of processes as it is about burdensome workloads and unnecessary requirements" (Harvey, 2004:216). The participants in this study confirmed concerns about the accreditation process and related power struggles raised by Harvey. Accreditation was described as a laborious process which created program implementation issues for staff. A further outcome of this bureaucratic process that some staff identified is that they felt hindered rather than supported by these institutions:

I mean they [accrediting bodies] would probably like us to do that [more site visits] but in practice they do not facilitate it. In practice, within an institution, we have not even been getting insurance for it and why should you take the risk.

(Staff Focus Group, G2, 2008)

. . . all these professional bodies see themselves as police rather than assist(ing) and help(ing) us. It's all very well accrediting everybody left, right and centre, but all you're

> *doing is getting people to gather data and you're not actually helping them generally to overcome their problems.*
>
> *(Interview, Head of School, I2, 2008)*

Having to satisfy the requirements of multiple accrediting bodies may be to the detriment of program curricula. The following observation aptly highlights this issue:

> *. . . our discipline is not one discipline . . . we are accredited by how many bodies, eight? I wonder whether engineering and architecture, for instance, are in a similar situation. . . . what does it mean that we might have eight different accrediting bodies? I think one of the things is we get lots of positive feedback and we get lots of ideas about what we can do differently, but that just means that we're really thin and shallow and broad.*
>
> *(Staff Focus Group, I4, 2008)*

Conversely, participants also discussed the positive aspects of accreditation and its importance for benchmarking against overseas universities, as illustrated in the following quotations:

> *. . . in one aspect it is difficult, but you need some mechanism I think. It's so important to have an external reviewer, it keeps you honest.*
>
> *(Interview, Head of Programs, C2, 2008)*

> *. . . there is a real benefit as well and if you've worked with industry bodies and worked well with them there's the possibility of benchmarking yourself on the international stage which we take very seriously.*
>
> *(Interview, Head of Programs, I1, 2008)*

In any study of this type it is important to remember that the comments about the accreditation process, both positive and negative, are the personal opinions of the academics interviewed. They are not necessarily accurate or correct. Some individuals appear to have misunderstood various dimensions of the accreditation process. Furthermore, some opinions may also reflect flaws in past processes which have since been remedied. However, the strong patterns that emerged from the interviews and focus groups cannot simply be dismissed. Without further detailed investigation it is not possible to test the validity of staff perceptions about the accreditation processes. It would be informative to evaluate the strengths and weaknesses of Australian accreditation systems identified in the mid 1990s (HEC, 1997) with those currently held for the Construction professions.

Literature about the rise of construction professions notes the often-contentious relationship between university academics and the professions (Gutman, 1989)**.** However, relatively few of these works mention the formal mechanisms that exist to mediate between the profession and the academy. These include accreditation processes, competency statements and registration examinations (Woods, 1999). Such mechanisms exist in most countries to monitor and control the qualifications and experience of people entering a profession, but they are rarely the topic of independent research and evaluation. One of the few studies of the way in which the professions and the academy interact was conducted by the Australian Federal Government who analysed several professions and their processes for accreditation, "credentialism", recognition and assessment (HEC, 1997). These studies found:

- The relationship between professional bodies and universities varies significantly between different professions with some much more closely aligned to their university counterparts than others.

- Universities have historically regarded professional accreditation as an intrusion but, since the rise of heightened quality assurance expectations, now regard accreditation as one of a large number of similarly valuable processes for assessing stakeholder needs.

- Professional accreditation is critical for attracting overseas students to study in Australia.

- Professional accreditation processes have little positive impact on the quality of student work, or graduate competencies; internal quality assurance mechanisms within universities have a much greater impact.

- Accreditation panels should not provide advice to universities on how to achieve competencies; but they should simply identify which ones are necessary and whether or not they have been achieved.

- There was a degree of confusion in documentation surrounding the difference between the expected competencies of graduates and of registered professionals.

- There should be more consumer and academic involvement in the development of professional competencies and accreditation processes.

None of these findings is specific to the Construction professions. However, there has been limited research into the professional accreditation of these programs in Australia and several of these themes are pertinent to this study. The sentiments expressed in the findings of the Higher Education Council are consistent with the issues identified here. The role of accreditation is to establish the credibility of professional education and decide what courses are needed in university programs. As stated by Warren and Wilkinson (2008:1) "The property and construction industry has relied heavily on its professional bodies to maintain educational and professional standards among its members and to regulate the profession for the benefit of its members and the public".

This section has shown that the accreditation processes for Construction degrees have a marked impact on curricula. The topic is one which elicited strong views from participants indicating that it needs to be addressed if the accrediting bodies are to retain their credibility and influence. At the same time, accreditation is an important and necessary process to ensure delivery of industry needs and the quality of these degrees. Some solutions to the accreditation issues discussed are considered in Chapter 7.

Another requirement of accreditation is that students should complete periods of industrial experience. This is discussed below.

4.3 Industrial experience

To be accredited by relevant Construction professional institutions, universities are required to mandate that students complete periods of industrial experience as part of their programs. The benefits of work integrated learning (WIL) are well recognised and have recently been documented in "the first large-scale scoping study of work integrated learning (WIL) in contemporary Australian higher education" (Patrick et al., 2008:v). However, those responsible for managing Construction programs have expressed reservations about industrial experience and WIL. These centre around the availability of placement opportunities for students during volatile economic times, and the resource implications of administering WIL. Some argue that, given the choice, it is debatable whether students would engage in industrial placements if these were not required by their degree program. The following quote summarises the main issues associated with organising industrial experience:

Problems associated with it I suppose, would be finding appropriate sources of experience providers. Also OH & S issues associated with it. That seems to be a big, big problem at the moment. You know really that's important, no question about it. We're moving towards a strategic relationship with major [contractor], as a result we will be exposing our students to far more industry practice. But it's still not enough for an entire cohort.

(*Interview, Head of Programs, A1, 2008*)

This study has identified that many students work in the construction industry whilst studying. Indeed, the increase in part and full-time employment of Construction students is well recorded (A. Mills & Ashford, 2004) and many academics commented on the tensions between work and study that ensue. This issue is discussed in more depth in Chapter 6.

Furthermore, the practices and processes for managing industrial experience appear to differ from university to university. Figure 10 shows the different periods of industrial experience required by different universities. A detailed investigation of industrial experience was outside the remit of this project. However, it is clear that the organisation of industrial experience is an issue that warrants further attention.
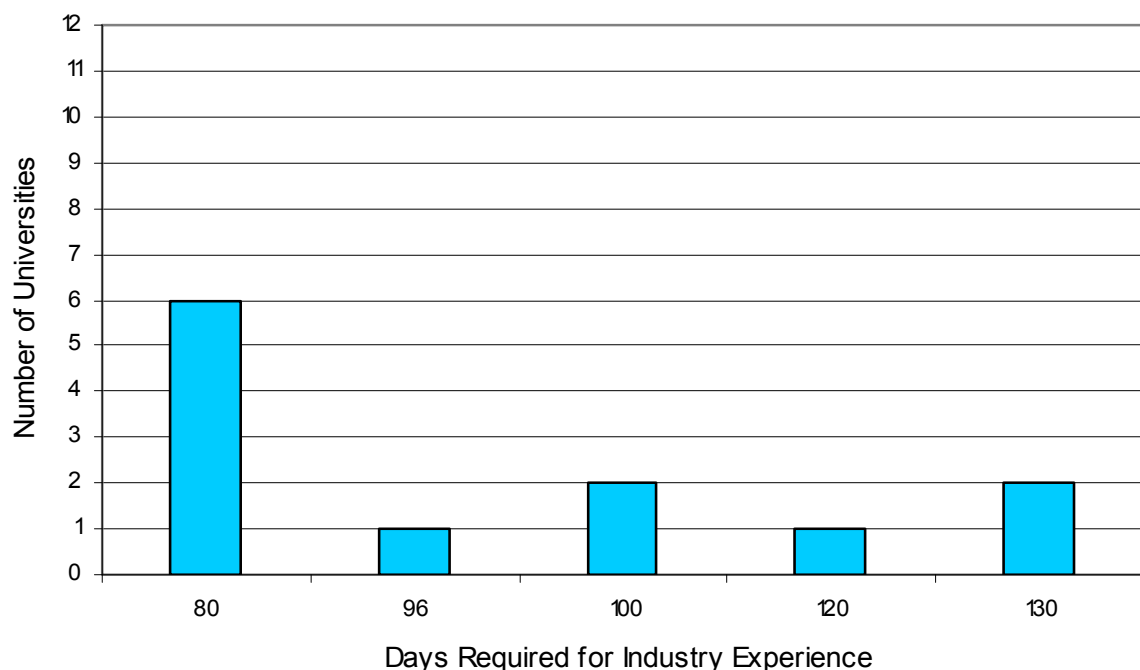
Figure 10: Industrial experience required by universities (Feb 2008) (Source: University websites, program guides)

Organising industrial experience, as well as the other pressures noted above, all impinge on the Construction programs. In addition, those managing these programs need to accommodate university requirements. These coalesce to create barriers to organizing curricula and teaching and learning for the disciplines as discussed below.

4.4 Challenges to curricula, teaching and learning

This chapter has identified the following factors which impact on curricula, teaching and learning in the Construction disciplines:

- fragmentation
- positioning of disciplines within university structures
- the status of the disciplines
- awareness of the disciplines
- vocationally oriented nature of programs
- accreditation
- industrial experience

Additional challenges were identified by Baxter who states that "graduates themselves [need to be] able to adapt to future change. There also needs to be greater attention paid to the quality of teaching within universities and more evidence that mainstream tertiary teaching pedagogy is properly applied within the programs offered" (Baxter, 2007:444).

It is clear that there are tensions between what universities teach, the industry's expectations and the requirements of professional bodies. The following are some ways these challenges could be addressed:

- Practical topics could be supplemented with materials taught at TAFE. There are positive and negative arguments for this approach. Students would receive varied teaching experiences which should enhance their skills. However, some might view such moves as a dumbing down of the disciplines, and as compromising the status and public perception of Construction noted previously.

- WIL could be embedded into Construction programs in a robust manner. Industry encourages students to work and there is considerable anecdotal evidence that many students learn a lot from such experiences. Clearly there are opportunities for all stakeholders to harness, but the manner in which industrial experience is currently administered could be improved. In particular, WIL needs to be rigorously assessed. Although this aspect was not explicitly investigated, it appears that assessment practices vary considerably between universities. Not only would this benefit current cohorts of students, it would pave the way for students with extensive experience to achieve recognition for prior learning.

4.5 Conclusion

The chapter discussed the following issues:

- Fragmentation of curriculum content: Construction disciplines tend to be situated with other allied disciplines, sometimes resulting in generalist courses.
- Placement of Construction academic units: Placement within university structures was found to influence the viability and success of these programs.
- Discipline status: Construction disciplines do not attract the same recognition and status as other traditional disciplines.
- Vocationally orientated programs: Tensions between education and training were identified.
- Accreditation: Meeting the accreditation requirements of multiple professional institutions makes onerous demands on staff time.
- Exposure to industry: Staff noted difficulties in arranging visits to construction sites. This lack of exposure to real-world construction activities may be off-set by industrial

experience activities, but there is considerable scope for work integrated learning (WIL) to be rigorously implemented and assessed.

- Changes to curricula, teaching and learning: The issues noted here will be challenging to address.

These points relate to a lack of awareness and understanding of the Construction disciplines by university hierarchies, the general public, the accreditation bodies and the construction industry itself. These issues have a profound effect on staff workload and morale, and are addressed in the next chapter.

5. STAFF

This chapter deals with the profile of the academics delivering Construction programs and the challenges they face. It identifies the pressures exerted by universities and industry on these staff and describes their impact on teaching and learning. Before considering these pressures, a profile of current staff trends and qualifications as at 2008 is presented, followed by a brief discussion of the issues these academics face. Both the profile (staff numbers, their roles and academic qualifications) and the context of Australian universities (funding cuts, lack of resources) provide relevant background for the remainder of this chapter – the pressures placed on academics who teach and administer the Construction disciplines. These include workload, resource issues, qualifications, currency of teaching-related industry experience, and pressures of student characteristics and numbers.

5.1 Profile of discipline academics

This section provides data on the numbers and levels of academics in Construction disciplines, their background and qualifications as well as their age distribution. The data presented were obtained from the results of an on-line survey (described in Chapter 2) unless otherwise stated.

5.1.1 Numbers and levels of academics

Where specified, data for the graphs presented in this chapter were compiled from university websites on-line in 2007 and 2008. A total of 129 academics were employed in NSW, Queensland, Victoria and Western Australia (mostly as 'lecturers') in 2008. In 2007, schools of Construction identified 129 lecturers as those who either taught the disciplines or made a substantial contribution to undergraduate teaching and/or administration. This number was revised to 116 and later to 107 (after the qualitative stage of the research). Forty-eight lecturers, 30 senior lecturers, 16 associate professors and 13 professors were identified. This snapshot, shown in Figure 11, reveals that most academics are employed at lecturer level, except for UTS which has a higher proportion of senior lecturers.

Figure 11 also shows that QUT, RMIT and UTS employ more academics than the other universities. A factor distinguishing QUT, RMIT and UTS is that they are members of the Australian Technology Network of universities (see (ATN, 2004) www.atn.edu.au) who traditionally have close links with industry and the provision of professionals for industry.

5.1.2 Academic qualifications

Figure 12 shows the academic qualifications of lecturers employed at the universities offering Construction programs in 2008. UTS has the largest number of staff with PhDs followed by UNSW. There is a high proportion of staff at The University of Newcastle and Curtin University who have obtained a Masters by Research. RMIT is the only university that has staff with Graduate Diplomas, although the data from QUT, UNISA, UTS and UWS included some 'unknowns'. Pressure on staff to upgrade their academic qualifications is explored in Section 5.2.2.
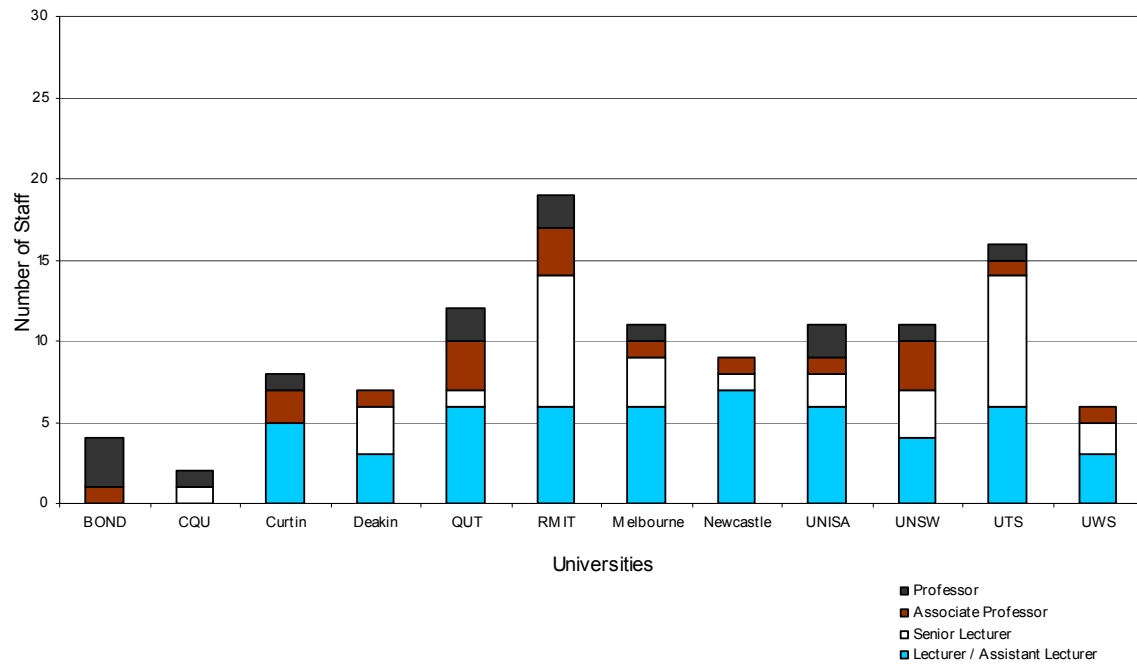
Figure 11: Total number of academic staff by university and position (May 2008) (Source: University websites and interviews)
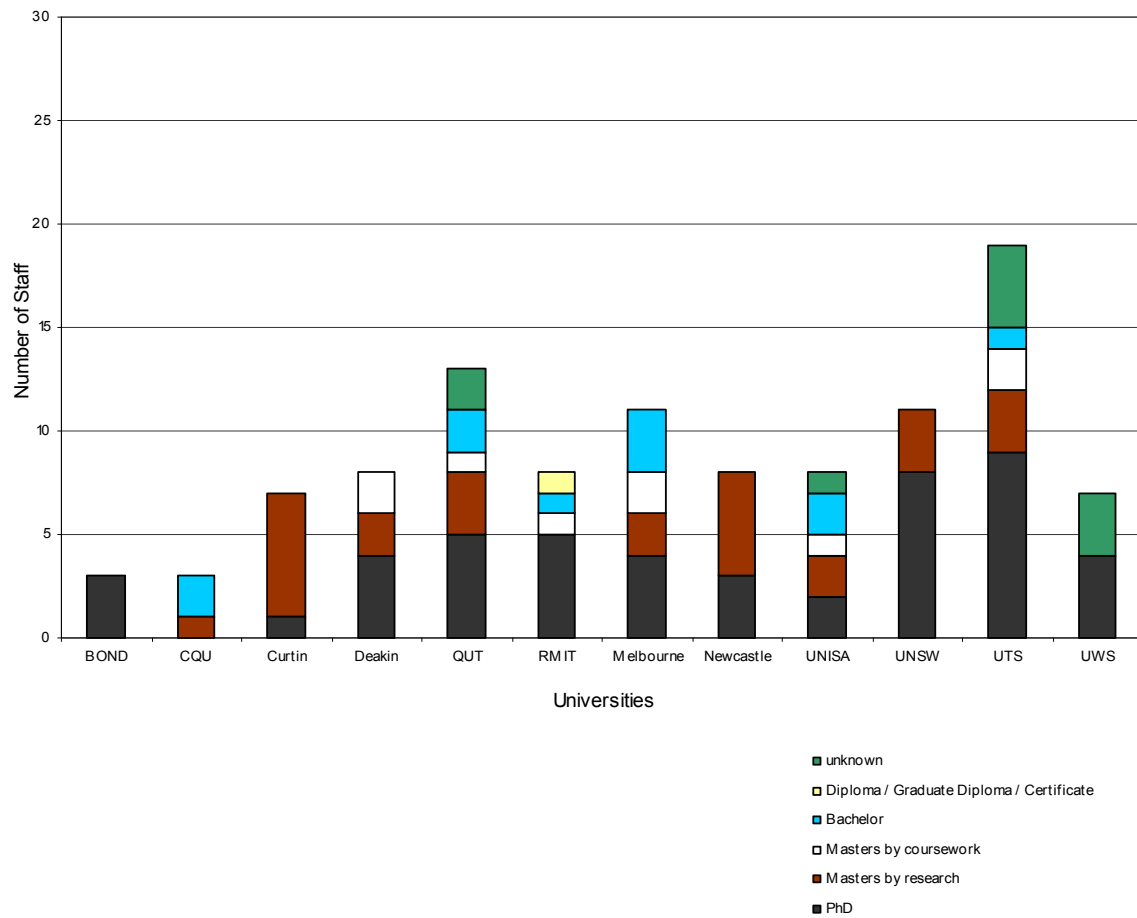
Figure 12: Level of qualifications of academic staff (March, 2008) (Source: University websites)
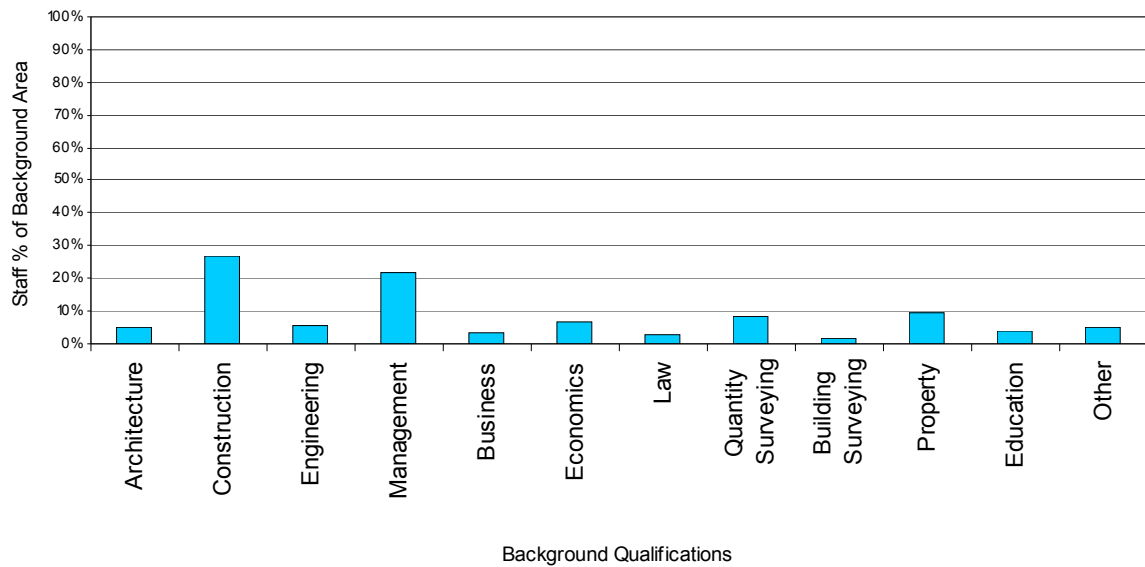
Figure 13: Background qualifications of academic staff, March 2008 (Source: University websites)

Figure 13 shows the field of qualification of Construction staff. The discipline most frequently studied is that of 'construction' (26.5%). 'Management' was the next most common qualification (21.7%).
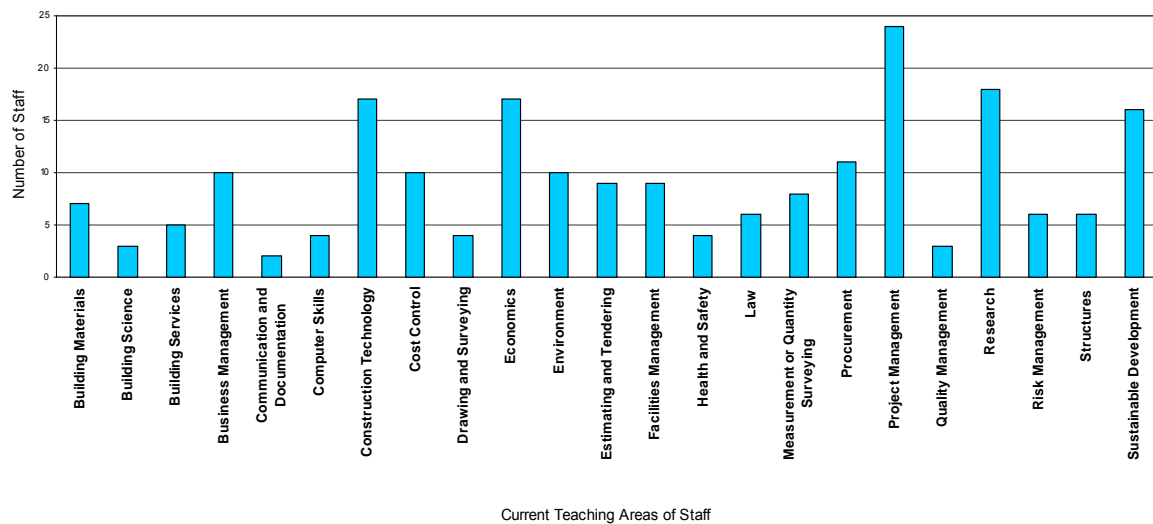
Figure 14: Current teaching areas of staff (Source: Online survey)

Figure 14 shows the topics that members of staff currently teach. The dominant teaching areas include project management, construction technology, research, sustainable development and economics, with project management being the area cited most frequently.
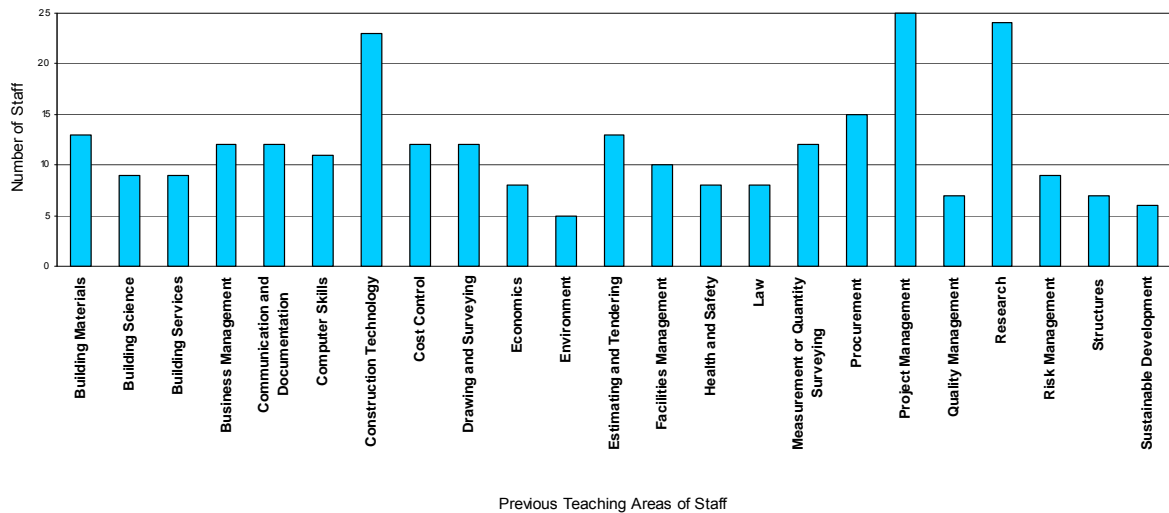
Figure 15: Previous teaching areas of staff (Source: Online survey)

Figure 14 shows the subject areas that staff currently teach. It is interesting to compare these topics with those taught previously, as shown in Figure 15. Research and construction technology are all lower in Figure 15 compared to Figure 14 whereas Sustainable Development has increased in Figure 14. Communication and documentation is higher in Figure 15, all these comparisons suggest a possible shift in focus within curricula over time.

Figure 16 shows the gender of Construction staff. In 2008 there were 21 female staff teaching across the nation (i.e. 19.6% of the total staff complement). UTS had the highest number of females (six) compared to other universities. Curtin University and Bond University did not employ any female staff at the time. However, women are employed in the significant majority of universities. These individuals provide much needed role models for female students. Low female participation is a trend in the Construction disciplines and the construction industry. Indeed, low female representation is also an international trend as noted by Fielden, Davidson, Gale, & Davey (Fielden, Davidson, Gale, & Davey, 2000:113) "Currently there are over 11 million women employed in the UK, accounting for 49.5% of the workforce. However, despite increases in the number of women employed in the construction industry over the past decade, they still constitute only 13% of the industry's workforce. This means that construction continues to be the most male dominated of all the major industrial groups".
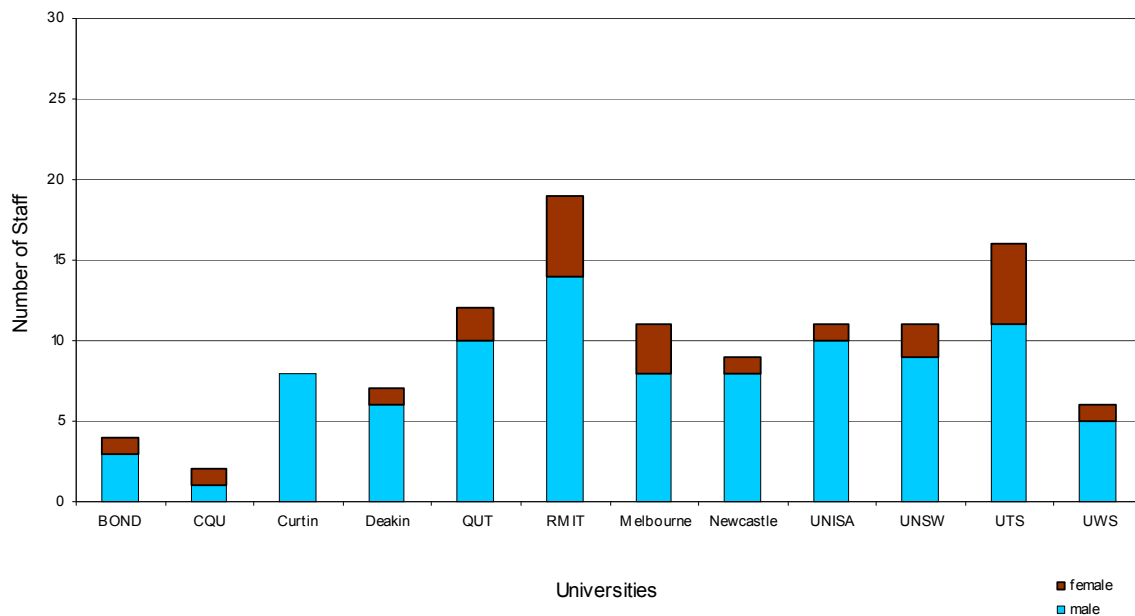
Figure 16: Gender of Construction staff (May, 2008) (Source: University websites and interviews)

5.1.3 Age distribution of academics

Figure 5 shows the age profile of Construction academics. Respondents were predominantly in the 36-55 year age bracket. This issue is further explored in Section 5.3.1. It is clear from the age distribution shown in Figure 5 and the quotation (below) that succession planning is likely to become a significant issue within the next five to 10 years.

> *I think we are at the stage where it is very difficult to find good teachers. And the other thing that is happening of course is our generation is moving through and we are sort of retiring. Younger people coming in are of a much different focus to what I had. I came into teaching because I did not want to go into research and that is simply because the universities have changed themselves. Their focus is on research and they are just matching up where their career will take them. It will take them further in research than it will in teaching.*
>
> *(Staff Focus Group, G2, 2008)*

This finding emphasises concerns noted in relevant literature (A. Dainty et al., 2007; King, 2008) that younger academic staff are not being attracted to teach at universities.

5.2 University pressures on academic staff

Australian universities have been subjected to numerous pressures over the past decade. These have been discussed in Chapter 3 and for convenience are summarised below as a backdrop to the remainder of this chapter. The key pressures include:

- **Funding cuts:** Universities have seen their government funding reduce steadily over the years. Abbotta and Doucouliagosa (2003:89) note that "Since the late 1980s the Australian Federal Government has shown an interest in trying to reduce the burden

on government finances of higher education by attempting to raise the cost efficiency of Australian universities". Some of the strategies universities have employed to address shortfalls include recruiting full-fee paying overseas students, industry partnerships, economising in various ways and so on. It is likely that funding challenges will remain as Australia (and the world) seeks solutions to the global financial crisis.

- **Cuts to administrative staff:** In response to the financial pressures already mentioned, many universities have reduced the administrative support provided to their academic staff. This has meant that academic staff have had to absorb some administrative responsibilities and cope with an increased workload.

- **Lack of resources:** Again, largely as a result of financial pressures, funding for laboratory-based subjects, laboratory equipment, site visits and other resources has reduced in recent years.

- **Sessional teaching staff:** Several factors have combined to increase the reliance of Construction providers on part-time (or 'sessional' staff). These include the aforementioned funding cuts, difficulties recruiting suitably qualified staff, inability of schools/departments to retain a full complement of staff and the aging of existing academic staff.

- **Research:** Most Australian universities require academic staff to engage in research activities. This has provided a unique set of challenges for vocationally based Construction disciplines.

- **Changed student profile:** Current cohorts of students are markedly different from their predecessors. For example, in commenting on the recently published "HE in a Web 2.0 World" report, the UK Higher Education Academy notes that "students typically spend four hours a day online, a figure that looks set to rise as teenagers make increasing use of Web 2.0 technology in their daily lives. One of the challenges for the higher education sector is therefore to ensure that staff can keep pace with the advancing technology which many of their students rely on every day, using the technology to enhance the student learning experience"(THEA, 2009). Exposure to and familiarity with computer technology distinguishes current students from their predecessors in significant ways. In addition, there is anecdotal evidence that students increasingly fund their own studies, and have commercially oriented expectations of their program providers.

- **Globalisation:** The Internet and (relatively) cheap national and international travel costs have meant that stakeholders in Construction education are not restricted by geographic boundaries. Students come from all over the world, and aspire to work in different locations. Similarly academic staff travel widely, and construction companies seek to procure work both within and without national borders.

- **New and defunct programs:** New programs are being implemented whilst some existing degree programs are being taught out (Ashford & Francis, 2007a). These create additional pressures for staff responsible for teaching out old curricula as well as for those adjusting and implementing new courses and programs.

Increased pressures within Construction disciplines and from universities have meant that academic staff experience difficulties meeting their workload commitments. Feedback from the online survey suggests that staff spend more time on administration and research and less time on teaching. These pressures are manifested in various ways, including increased amounts of teaching, teaching across wide ranges of content areas, teaching large student cohorts, being active as a researcher, etc. Each of these has consequences for programs and for students' experiences. They are significant and need to be fully understood.

5.2.1 Resources

The increased workload noted above compounds the challenges staff face when attempting to engage with new technologies such as Learning Management Systems (LMS). When adapting to the use of LMS, staff need to learn how to use the technologies, familiarise themselves with alternate teaching approaches, refocus their lecture and tutorial materials and so on. These activities are time consuming, and many academic staff are cautious about converting to such new media. This is illustrated in the following quotation:

> *Blackboard (LMS) has all of that, it's just our staff don't necessarily use it as much as they might.*
>
> *(Interviewee)*
> *(Staff Focus Group, L4, 2008)*

Most staff need to be trained to use these systems but like all activities, this takes time. Learning or having the time to use an LMS is yet another activity competing for Construction lecturers' time, and it is understandable that some staff have other priorities.

In addition to the above, some staff identified lack of space for students as another resource constraint. Where such space was available, staff and students commented that it was inadequate. For example, staff mentioned the following:

> *The other difficulties . . . are that we do very little laboratory work these days. We don't have much space so we don't have the normal wet laboratories.*
>
> *(Interviewee)*
> *(Interview, Head of School, I2, 2008)*

> *I think it's inappropriate space. Facilities were built many years ago for inappropriate classes or activities today. The second thing that worries me is that the quality of facilities we offer students is inferior to what they're receiving in their secondary school education in this country. So we now have a situation where students come to us from even the poorest of our high schools having better teaching and learning facilities and resources in terms of staff to student ratios, materials, than we are offering in this school.*
>
> *(Interviewee)*
> *(Staff Focus Group, L4, 2008)*

Students expressed similar views as follows:

> *But there is still a massive lack of space. Even last night, we had a class in a room and then all the second year architect students were all in the hall doing their presentations because they clearly didn't have a room or something.*
>
> *(Interviewee 1)*
> *(Student Focus Group, F4, 2008)*

Some students also identified additional computer-based activities as desirable. For example, the following excerpts highlight the need for up-to-date computer hardware, software and training:

I suppose just keeping up with the technology that's . . . changing. Like our work environment . . . there's a lot of IT software that's starting to come out which I'm not too sure if our course will keep up with . . . or if they'll try and keep up with it. Then they'll be at work learning all the stuff like the 3D stuff or CAD and things like that which they don't really focus that much on at uni. Like they do touch on it but I think they only spend maybe half a semester on it or something . . .

(Interviewee 2)

I'd probably just say the same thing because we don't so far have any subjects that deal with the software side of things apart from measurement but they're still using the old system.

(Interviewee 1)

So do you feel that your lecturers aren't in touch with the latest IT stuff?

(Facilitator 2)

Some are but then there's also some who probably haven't been working in the industry for a long time.

(Interviewee 1)

(Student Focus Group, C4, 2008)

In my job I've had to do invoicing. When you get a job it's things like that you're going to get dropped into. And if you don't know anything else, just from here, basically you're in trouble.

(Interviewee 1)

You need to know some of the basic management systems?

(Facilitator)

Yes.

(Interviewee 1)

Some software programs?

(Facilitator)

Yes.

(Interviewee 1)

We haven't looked at a computer.

(Interviewee 2)

You don't use (Microsoft) Project or anything like that?

(Facilitator)

No.

(Interviewee)

You haven't done CAD?

(Facilitator)

No.

(Interviewee)

There's a lack of IT in the program?

(Facilitator)

Yes.

(Interviewee)

As illustrated above, facilitating computer-based classes and tutorials is becoming increasingly difficult. Large student cohorts require not only appropriate hardware and software; they require tutors with the requisite knowledge and skills to teach. It appears that present computer laboratory facilities are, in many cases, stretched.

Another resource that is proving problematic for staff to facilitate is that of site visits. Several factors have, in recent years, combined to make such activities difficult to organise including: securing access to construction sites (some construction contractors are hesitant to allow large numbers of students onto site); increased legal requirements which lecturers need to negotiate (including risk assessments, arranging insurance etc); and funding for transport costs (which used to be borne by universities but which are increasingly being met by students themselves). Furthermore, some staff said that when they had organised site visits they were poorly attended.

> *The other thing which is a characteristic is site visits. Contractors do not want students on sites. We cannot take them on site; they have got to have blue cards, red cards all the other types of things to do it. The old days you could just go for a site visit are way gone. You have to make sure they are done properly; you have an induction when you go on the site, and the contractors' agreement must be reached. So all that joy of going to look at a new project, many lecturers are just saying it is just too much. It is just too hard. I will go and take some photographs and show them the photographs rather than taking them on the project. I think in our discipline that is quite sad.*

> *(Staff Focus Group, G2, 2008)*

Clearly the demands staff need to satisfy to arrange and manage site visits have become onerous. Not only do they need to comply with additional legislation, they need to do so with fewer resources. The decline in opportunities for students to experience site visits is entirely foreseeable and understandable.

This discussion has highlighted how a lack of resources has exerted pressures on Construction staff and their teaching practices. It has also revealed how a lack of administrative support and increased industry regulation has impeded student access to opportunities which enhance their learning. Furthermore, staff need to accommodate these pressures and at the same time respond to university imperatives to enrol in higher degrees and conduct research. This is explored in the following section.

5.2.2 Research and promotion issues

Conducting research and completing research higher degrees

Both in the online survey and during the focus group discussions, academic staff noted increased pressure to secure research funding, and to pursue a research higher degree (at Masters and PhD level) if they did not already have one. Staff felt that this increased their workload and commented that this reduced the time they would otherwise spend teaching students. Also of concern to them were the promotion criteria at many universities which appear to favour research (See 'Promotion' below). It is clear that pressure to research has created tensions which staff have to accommodate on a daily basis. Not only are they expected to satisfy their teaching commitments, many are also asked to complete higher degrees, seek research funding and, where successful, conduct and/or manage research projects. This is illustrated in the following quotations:

Do you feel as though there's pressure to do [research] as well?

(Facilitator)

Well at the moment I have. Yeah. I feel . . . pressure.

(Interviewee 3)

There's no question about it. Even so called teaching universities, they'll put the spin that teaching is important. But the promotional prospects are very dependent on research. So let's not kid each other. Any university will judge a staff member's promotional prospects by PhD and research outcomes. In fact, research grant applications and success.

(Interviewee 2)
(Staff Focus Group, F3, 2008)

It is worth noting that Construction disciplines are not unique in this regard. Most academic staff are expected to research and teach. However, what is different is the vocational nature of Construction programs and the lower status of Construction related research (as described in Section 4.1.3). Moreover, anecdotally, many Construction professionals question the relevance of research whilst many academics question the relevance of industry research. Several staff expressed concerns that time spent on research compromised their teaching, as indicated in the following discussion:

We really need . . . good teachers and researchers. Getting that balance is something that is getting more difficult to do.

(Interviewee 2)

It is time as well within the universities. Trying to get that balance, as XXX says, is very difficult when the pressures are on you to produce, to publish, to be members of committees, to interact with the community and the various professional bodies it leaves very little time for . . . I know my teaching, and fortunately I have built up a number of years where I have got a lot of material. But if I was a new teacher I would find it extremely difficult to have enough time to build up that critical mass of really good teaching so I could take time in the other activities that the university is saying are very important too.

(Interviewee 1)
(Staff Focus Group, G2, 2008)

This quote highlights the balance required between research and teaching. In addition, those responsible for managing the delivery of a Construction degree program have to navigate the directions that universities require them to take, as well as those that the professional institutions (and industry) wish them to take. As previously mentioned, universities require lecturers to conduct research, whilst professional bodies and industry emphasise the need for teaching with a practical bias and less 'academic' research. Finding an appropriate balance is difficult, as the following quote shows:

And we are struggling to become researchers. Most of the people (say 80 per cent of the discipline across Australia) would be professional-based disciplines, because that's what the industry bodies want. And then it's hard to get a promotion with that. So when you leave that and become a strong academic then you lose the students. And the accrediting bodies are not happy with that either. So it's . . . a very difficult

> *balance and very strategic people can be both of them and very successful but otherwise it's a challenge actually, it's a challenge.*
>
> *(Interview, Course Coordinator, A2, 2008)*

This gap between practical and academic research combined with other industry (practical teaching) and university (research) pressures make it difficult for Construction academics to match the research outputs of their colleagues in other disciplines.

On the other hand, universities argue that teaching should be informed by research. Construction staff appreciate the synergies between teaching and research as shown in the following quote:

> *There's no question that research can enhance . . . teaching . . .   There's no question about that at all.*
>
> *(Staff Focus Group, F3, 2008)*

This highlights difficulties for staff in establishing connections between research and teaching. Griffiths' (2004) investigates this in his research (which reports on a study similar to this one) into the teaching-research nexus in built environment disciplines. He confirms that other academics are suspicious about 'consultancy' type research in industry within a university setting, "especially if the public availability of the findings that are produced is restricted by the terms of the contract with the clients" (Griffiths, 2004:717). In addition, he notes that research in these more practical disciplines may not be recognised by universities. He argues that in "practice-orientated fields, the provision of expert advice may not entail the kind of rigorous, hypothesis-led, methods of empirical science, and may not lead to published outputs in recognized academic journals" (Griffiths, 2004:718). Griffiths also found that research is either "weakly embedded in teaching activities . . . or . . . it can be more strongly integrated" (Griffiths, 2004:721). He notes that Construction courses focus on practical 'professional skills' rather than on 'critical inquiry', making research difficult to integrate into teaching (Griffiths, 2004:723). Overall Griffiths emphasises that when research is integrated into teaching it is beneficial for staff and students.

Promotion

Some staff argued that the abovementioned lack of recognition of Construction research, the limited time they have to conduct research as well as the need to obtain a higher degree, combine to inhibit their promotion prospects. The following quotes illustrate the perception that research performance is connected to promotion:

> *I think the pressure is for us to do more of everything and the university assess it—yes, they do really value good teaching, but then they don't when it comes to, for example, promoting the best teachers and those sorts of things. Part of your application for promotion seems to be very heavily weighted towards what research you've done.*
>
> *(Interview, Programs Coordinator, I3, 2008)*

> *So it is driven—research drives the promotional prospects of the people. It's up to the individual how much they want to achieve.*
>
> *(Staff Focus Group, F3 2008)*

Results from the online survey confirmed a low rate of promotion for Construction academics to date (see Figure 17).
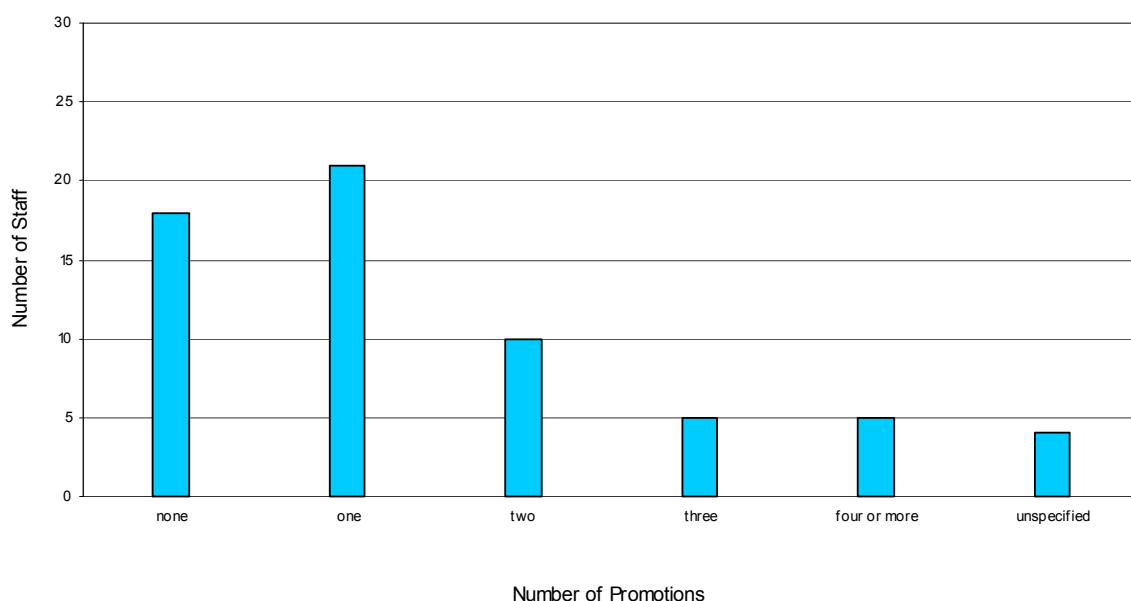
Figure 17: Number of promotions for Construction staff (Source: Online survey)

A high percentage of respondents had never been promoted or only been promoted once. This could be due to the specific nature of these disciplines as Construction staff are generally required to have relevant and up-to-date industry experience. It appears that many of these staff embark on a teaching career later in their working life, having been employed in industry before starting at university. Later entry into academia generally appears to inhibit promotion because it takes time for new academics to become research active (regardless of their experience in industry). The following quotes summarise this key issue:

> *But the other mix of it is that we often come into the discipline a lot later. In a number of the really outstanding research schools in our uni, they come through from undergraduate, they do a PhD here, then they start tutoring, and then they start teaching. So they've had this really quite long association with the university. And most of our staff graduate, go out and work, minimum five to eight years or so, and then come back in. So we're eight, ten years behind really, aren't we? We might have snuck in a Masters somewhere by coursework or research maybe. Most of us come back into academia and then start our academic career, don't we?*
>
> *(Staff Focus Group, A3, 2008)*

> *I think that's an ironic thing in a way . . . most of us come from an industry background of at least 10 years in industry and that's extremely valuable to the teaching, but it doesn't do our careers any favors in terms of promotion.*
>
> *(Staff Focus Group, I4, 2008)*

A further consequence of this late entry into academia is that many lecturers find it challenging to obtain research funding and become successful researchers. In this context, it is also interesting and relevant to note that many Construction staff have taught at more than one university (see Figure 18).
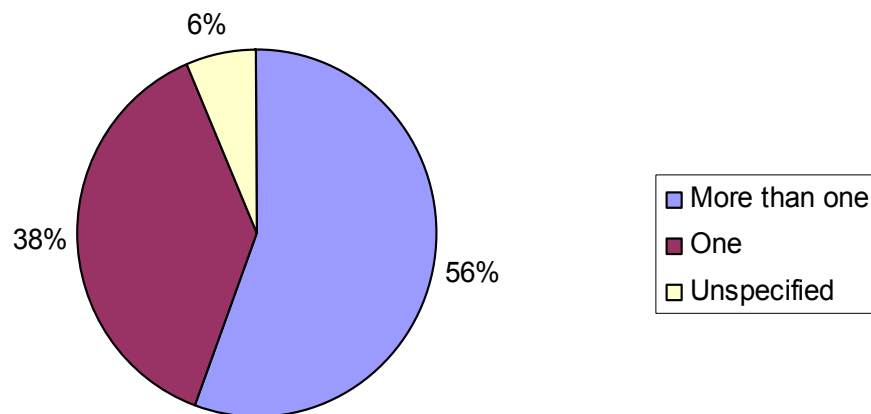
Figure 18: Number of universities Construction staff have taught at (Source: Online survey)

The reasons for this mobility were not established in this study, but anecdotal evidence suggests that moving university may be used as a strategy to gain promotion. Discussions with staff supported this observation as the following quotation illustrates:

We're not losing that many staff to other universities. 'Cause other universities are largely in the same situation. Where it arises is, if an associate professorship comes up in another university (academic staff) are . . . stepping up where people are moving to other positions, where those people, generally speaking, wouldn't have got promoted internally had they stayed.

(Staff Focus Group, J3, 2008)

Staff were also asked their reasons for changing universities. Figure 19 summarises their responses and suggests that staff have changed universities for a variety of reasons including promotion.

This section has highlighted some of the difficulties Construction staff face when they seek promotion. These are numerous and include a plethora of factors such as having to conduct research, and entering academia later in life. Later entry into academia restricts the time staff have for their professional and research development, as they initially concentrate on their teaching activities. This is important, because universities may look to industry to address the lack of Construction lecturers forecast for the next decade. Clearly such individuals have a lot to offer, but will need to be supported in innovative ways to ensure the meet all stakeholders' and their own expectations. The requirement for existing academic staff to update their industry experience is explored further in section 5.3.2

In addition to the pressures described above, many staff are expected to take on increased administrative responsibilities. The challenges these present are described in the next section.
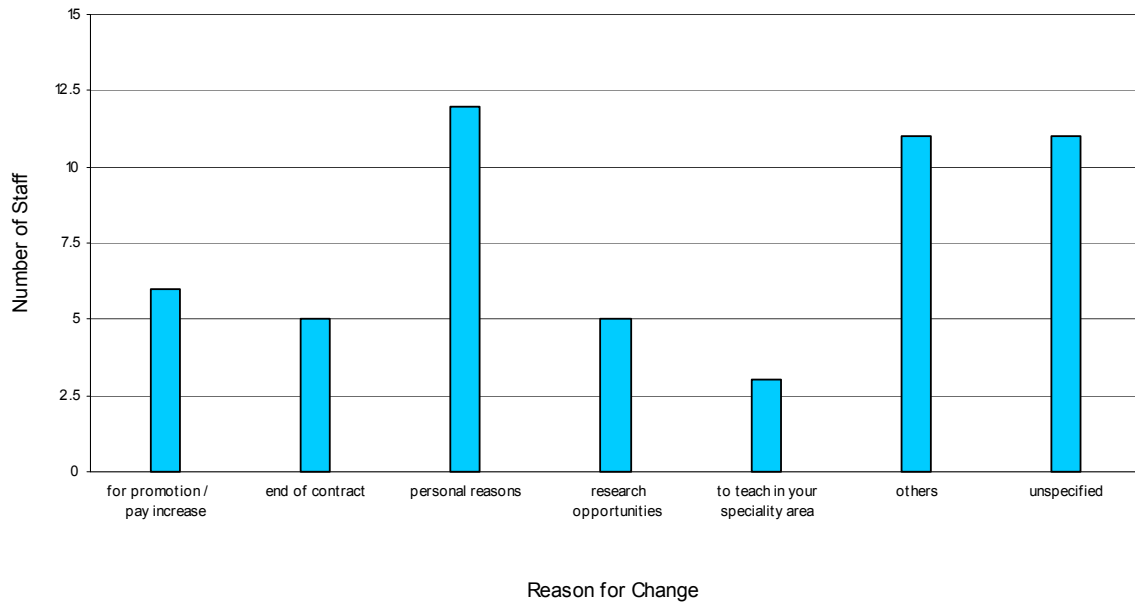
Figure 19: Reasons for Construction staff changing universities (Source: Online survey)

5.2.3 Increased administration

Many Construction academics feel that their administrative workload has changed over recent years and is currently at a very high level. This, in turn, affects their ability to teach and research. During interviews and focus groups, staff highlighted cut-backs in administrative support which have significantly affected them. Academic staff now engage in many administrative activities over and above their teaching and research responsibilities. Most universities categorise staff activities as teaching, research, administration and other (such as community engagement or similar). Academic staff were asked to reflect on how much time they spent in each of these areas. Some difficulties were experienced as the boundaries between administrative and some other activities were hard to define. For example, one interviewee stated that:

> (It) depends by what you mean by administration. For instance, course coordination I would classify as administration, but other people might say it's all part of the teaching process.
>
> (Staff Focus Group, I4, 2008)

Notwithstanding these ambiguities, there was a strong perception amongst staff that they were burdened by inordinate amounts of administration. Staff workload elicited from the online survey is summarised in Figure 20.
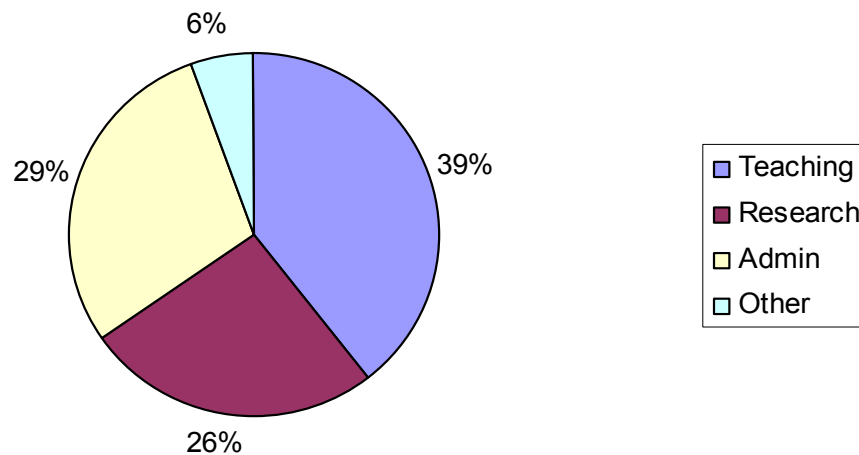
Figure 20: Construction academics' administrative, teaching and research workload (Source: Online Survey)

The results from the online survey (Figure 20) indicate that staff are spending more time on administration and research and less time on teaching (approximately 40% teaching, 25% research, 30% administration and 5% 'other'). The 'other' category includes liaison with industry, networking, career mentoring, writing grant applications and consultancy projects. Staff mentioned that they are struggling to find time to address all areas of their workload and this appears to be largely as a result of increased administration responsibilities:

> *I didn't come here to be an administrator but when I sit on the train with my wife and explain or mention what I've been doing through the day, she often picks me up and actually asks me whether I'm actually an academic staff member or an administrative staff member. I think the admin has just become a huge proportion of my day, that's one of the biggest changes I've noticed.*

(Interviewee 1)

> *I'd agree with that.*

(Interviewee 2)

(Staff Focus Group, D2, 2008)

This quote shows how much administration duties impact on academic staff time.

Although Figure 20 shows that staff spend a considerable proportion of their time teaching, they also need to conduct research, complete administrative duties and engage in a host of 'other' duties. It is interesting to observe that time spent on administration is more than that spent on research. However, it should be noted that what constitutes an administrative duty is ill-defined. For example, course coordination may be categorised as administration by some academics but not by others. In addition, many staff now type their own documents. Exactly how these and other tasks (which in many cases were completed by administrative staff before the personal computer revolution) were categorised is unclear. For example, some staff spend considerable amounts of time coordinating timetables and organising sessional teaching staff, as noted by one who said:

We spent a half a day writing applications for three sessional staff contracts because it's so fiddly and complicated . . . A half a day out of . . . 10 half days in a week is a lot of time and then it never goes through smoothly and there's always something that comes back.

(Staff Focus Group, I4, 2008)

Administrative workload is thus subjective. In summary, many staff feel that it has changed significantly in recent years and is currently too high. They argue that this impinges on their ability to teach and research.

This section has shown how changes within universities have affected staff. It has highlighted new activities for which academic staff are now responsible. These tasks, coupled with pressures to conduct research, have influenced their prospects for promotion.

5.2.4 Student pressures on staff

The increased number of students currently enrolling in Construction programs has naturally been accompanied by more interactions between students and staff. For example, staff noted that students are increasingly disputing the marks awarded to them for their assessment items. Staff identified a new type of student who is more demanding (an aspect which is explored in more depth in Section 6.1.6). As one participant stated:

They [the students] are always trying to push it a bit further and it puts a lot more pressure on the staff. I think without experience of dealing with these situations it is often very hard for them [staff] to turn down any claims by students that their marks ought to be reassessed or to go to a higher authority for review. That puts a lot of pressure on staff and it is a lot of time as well. I think that is a new element [of workload] that has come in, in the last ten years.

(Interview, Head of School, F1, 2008)

Several staff members also identified responding to students' postings in LMS as pressure on their workload:

There's arguably an impact of going electronic as well. Because you've got to keep in touch with all the discussion forums as well. My experience is if you leave it to once a week, it becomes an insurmountable task, so you've got to do it once a day.

(Interviewee 1)

That's right.

(Interviewee 2)

I agree. I personally have a constant knot in my stomach, thinking of these discussion posts building up.

Interviewee 3
(Staff Focus Group, A3, 2008)

These quotes highlight other pressures on staff that might not otherwise be apparent. Additional pressures on staff, such as teaching large classes and assessing the work of large numbers of students in a timely manner are explored in the next chapter.

The sections above have identified several sources of pressure that impact academic staff. They have identified resources that need to be deployed to service teaching and learning, factors which impact on staff research and promotion prospects, increased academic involvement in administration and new pressures from students.

5.3 Industry pressures on academic staff

This section describes the pressures and expectations that industry and the accrediting bodies have of academic staff. A key requirement is that staff should be conversant with current industry practices. Meeting this expectation needs to be addressed when staff are recruited as well as throughout their academic career. This section therefore deals with recruiting staff and facilitating staff continuing professional development (CPD).

5.3.1 Recruiting staff

A concern voiced by most heads of Construction programs is that it is extremely difficult to recruit suitably qualified full-time academic staff. There are several factors to be considered in this regard. 'Suitably qualified' means different things to different people. To many universities, a prime requirement is that candidates should have a research higher degree (or be in the process of obtaining one). To the professional bodies that accredit Construction degrees, 'suitably qualified' means having current experience of working in their disciplines. The reality is that there are extremely few candidates that satisfy these requirements. Indeed, many argue that these requirements are mutually exclusive as any practitioner with solid industry experience is unlikely to have had time to obtain a PhD. Similarly, there are few PhD graduates with industry experience who are looking to return to academia. Furthermore, staff (especially heads of schools) indicated that it is very difficult to employ academic staff with industry experience. It was found that graduates from these disciplines and those already working in construction are likely to pursue careers in industry, as salaries there are considerably higher than in academia. Indeed, during the interviews it became apparent that some Construction students working in industry earn more than their lecturers. However, the global financial crisis may well affect this situation.

> *Well one of the reasons [for the lack of Construction teachers] . . . is because industry people can earn a heap more money in industry than they would do as academics. Half of my students earn more than I do. So I'm talking about prior to graduation. So I don't think there's an awful lot of incentive to come into academia.*
>
> *(Interview, Head of Programs, A1, 2008)*

There is clear tension between universities' criteria for appointing new academic staff (research-orientated staff with a research higher degree), and the requirements of industry and the professional institutions (practically-orientated staff with a teaching focus). Furthermore, most universities are finding it difficult to recruit 'suitably qualified' staff.

The lure of high industry salaries (compared to those offered at universities) makes recruiting academic staff with industry experience difficult. This state of affairs has been recognised by AIB, who state that:

> *Australian universities are at risk of not having any building graduates teaching building and construction programs in ten year's time.*
>
> *(AIB, 2008a)*

AIB has lobbied the Vice Chancellors of several universities, asking them to review the salaries of Construction academics with a view to matching what they would receive in the private sector (AIB, 2008a). It appears they have not been successful, and world events (especially the global financial crisis) have overtaken these initiatives. Current economic forecasts for the construction industry appear bleak, and it could well be that 2009 sees a resurgence of industry practitioners seeking work as university lecturers.

However, staff recruitment is a major challenge for the Construction programs. Several paths warrant exploring to address this situation. One is to encourage Construction students to consider academia as a career path. Another is to employ industry practitioners as sessional teachers. These opportunities are discussed below.

Construction graduates as academics

There is ample evidence that Construction graduates prefer to enter the industry rather than to seek tertiary qualifications (Clive Warren et al., 2005). However, if the shortage of lecturers is to be addressed, steps need to be implemented to attract graduates to consider academia as a career path. Not only do graduates need to be attracted to academia as a profession, ways need to be found to allow graduates to gain industry experience.

Sessional lecturers

Many providers employ sessional (or part-time) teaching staff. This is a pragmatic response to the shortage of qualified staff as it addresses the challenge of recruiting lecturers with up-to-date practical knowledge. These individuals are not expected to conduct research. Furthermore, they may have experience and expertise that academic staff lack. This is arguably the case with respect to some modern software applications that are used in industry, as illustrated in the following quote:

> *If you've got somebody who's expert in that area [Digital technologies, BIM] why on earth would they come here to teach it when they could earn a lot more money . . . in industry? So once again that's a classic area I think where you need to rely on sessional staff that are using this kind of technology day in, day out.*
>
> *(Interview, Head of Programs, J2, 2008)*

Notwithstanding the potential solution which sessional staff provide, it is not always easy to recruit them.

> *However it is hard to find sessional and casual staff: in fact, that is a problem for us trying to find qualified casual teaching staff to cover study leave workload.*
>
> *(Interview, Head of School, J1, 2008)*

There is evidence that some sessional staff view their involvement at university as volunteering and are primarily motivated by seeing students learn. They do not consider university to be a way of appreciably increasing their income:

> *Because they love it is the only reason I have ever heard, because the students are getting something. Sometimes it is a recruiting thing as well, if you can find a few good people and take them back to work with them but it is not the money.*
>
> *(Interviewee 2)*

> *I don't think they're [sessional staff] here for the money . . .*
>
> *(Interviewee 1)*
>
> *(Staff Interview Head of Programs and Course Coordinator, K4, 2008)*

In this regard it is interesting to note that volunteering was mentioned by some full-time academic staff when they commented on their career. Quite often they said "you don't do it for money".

There are clear benefits associated with employing sessional staff. However, there are also some associated challenges. The task of recruiting and managing sessional academics is not trivial. Furthermore, reliance on them may compromise the research efforts of full-time academics. Researchers benefit from critical comment and debate with their peers. Clearly, if the pool of people with whom researchers can interact diminishes, research quality and output may also suffer. Many Construction providers are currently seeking to enhance their research profile, and any activity that detracts from this would have a long-term impact.

5.3.2 Industry CPD for staff

Some of the issues discussed above are arguably common to other academic disciplines. However, the AIB, AIQS, AIBS and industry professionals strongly recommend that academic staff have current industry experience. Figure 21 shows the current situation with respect to the years of industry experience Construction staff accumulated. More than half the staff have extensive industry experience, ranging mostly from six to 30 years.

However, Figure 21 does not illustrate the currency of this experience. In many cases it has been some time since staff worked in industry. Figure 22 shows the number of years since staff were employed in the construction industry. In the vast majority of cases it is at least five years since staff worked in this capacity.

In some cases full-time academic staff are also able to continue to work in the construction industry. Figure 23 shows that 11 (or 17%) of Construction academics currently also work in the construction industry in various capacities. Clearly the issue of staff industry experience is a complex one but it is also apparent that few staff have up-to-date industry experience.
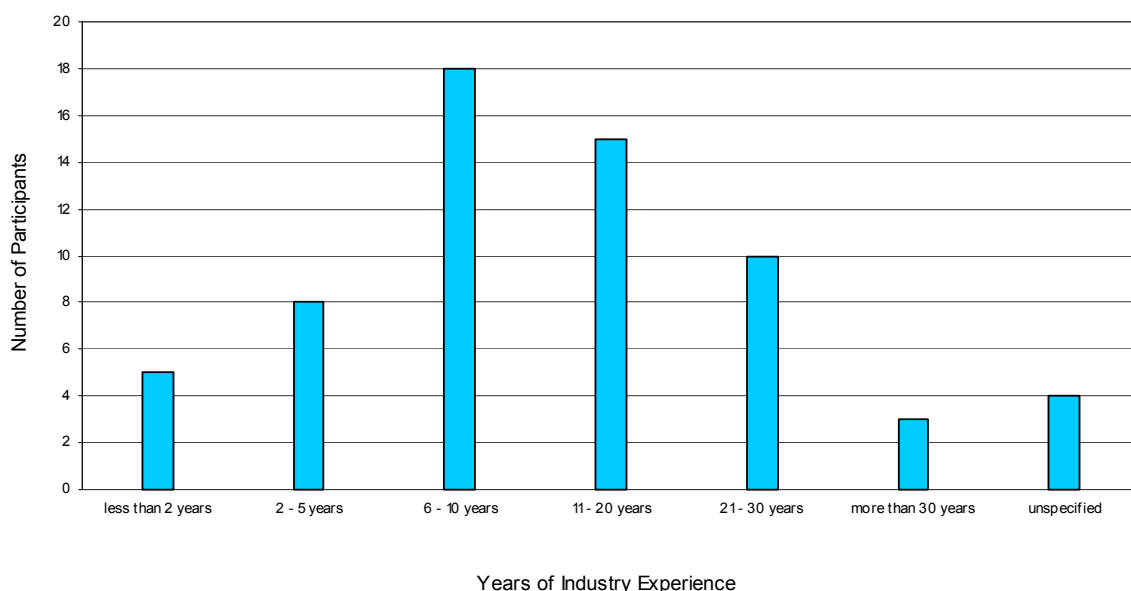
Figure 21: Industry experience of Construction staff (Source: Online survey)
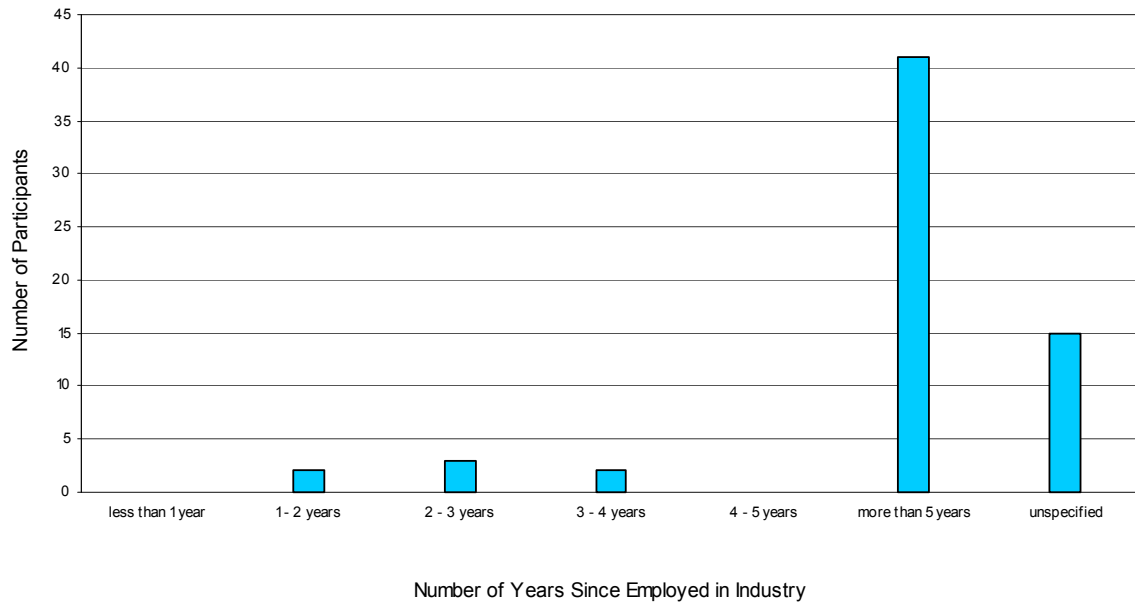
Figure 22: Currency of industry experience of Construction academics (Source: Online survey)
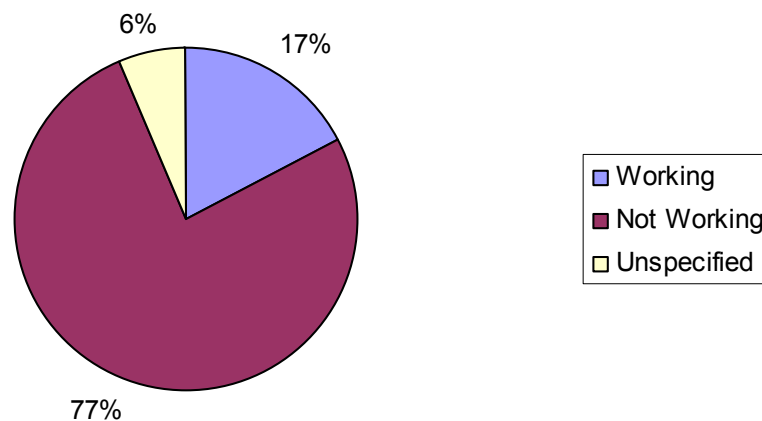
Figure 23: Construction staff concurrently working part time in industry (Source: Online survey)

Construction academics need to maintain the currency of their knowledge of industry practices and procedures. Several members of staff indicated during discussions that this is a considerable problem. The following quote emphasises the need for teaching to be informed by industry experience:

> *The perception is your academic career doesn't really start till after you do your PhD. But when we're facing a very practical, vocationally-orientated, professionally-orientated group of students. We've got to have stories to stand up and talk about to*

our students as well. And we generally get those stories from our experiences in practice, don't we?

(Staff Focus Group, A3, 2008)

The next quote highlights how increased teaching and research workload can prevent staff from gaining industry experience to support their teaching:

Again I think there is also an issue (again related with workload) . . . the currency of what we're teaching them. Being able to bring experience to the industry, into what we teach. Because with the time limits on teaching and research it will be very difficult to justify additional time—then to be able to go out then and actually practice and understand what's happening in the industry.

(Interview, Head of School C1, 2008)

Having to be familiar with current industry trends becomes problematic when staff have worked in academia for a long time. The following quote presents the observations of one head of school:

And I think the knowledge that they [staff] have is starting to become dated. It is not a major issue for the course at this stage because we use a lot of sessional or part-time staff out of industry but I think the full-time guys and girls need a lot more access to industrial experience.

(Interviewee)

And those individuals are probably finding it challenging to engage with research as well?

(Facilitator)

They are, yes. Some of them are trapped in teaching, if you like. That is a resource issue . . . We just do not have enough bodies to get them out of it, I suppose

(Interviewee)

(Interview, Head of School, L1, 2008)

It may be possible to have staff engage in industry focused CPD. A head of program's views on this are provided below:

I think a good practice would be for staff to be released for periods of industry experience . . . Study leave is supposed to allow staff to, if you like, provide a springboard for another two and a bit years worth of productive research. It would be far easier to do that by touring universities and conducting research projects than it would be to say shadow industry practitioners. Although I don't say it's impossible I think it would be harder to generate two and a half years worth of research from industrial experience. One of the ways around that I guess is to have a rolling program of guest lectures from industry practitioners. But that requires a lot of planning. And frankly with all our other duties it's actually quite difficult to find time to organise that.

(Interview, Head of Programs, A1, 2008)

Approximately 10 participants also suggested refresher industry experience as a way staff could update their skills. Organizing such opportunities would require the commitment of several stakeholders and is likely to be challenging. An informative example of an overseas

venture is the Industrial Fellowship Scheme in the UK, (Foundation, 2008). The website for this scheme states: "Since September 2007, further education lecturers have been required to undertake at least 30 hours of continuous professional development (CPD) pro-rata. The Industrial Fellowship Scheme, running since 2005, and backed by generous financial support from the Gatsby Charitable Foundation enables each participating college to apply for a grant of £12,000 towards the secondment of up to 3 of their nominated science, engineering, construction and technology lecturers to take secondments with local businesses or technical/scientific research centres in Universities, thereby raising the lecturers' skills and knowledge and achieving the industrial relevance and context to their teaching, thus improving the overall learning experience of the students" (Foundation, 2008).

In conclusion, this section has shown that the shortage of Construction academics currently being experienced is likely to worsen in the next decade. New opportunities to encourage staff need to be explored. Insufficient numbers of academics are likely to be recruited from students graduating from Construction programs. Some staff may be recruited from industry, but these individuals will find it difficult to meet the research expectations of universities. In addition, this section has shown that these pressures impact on staff workload and resources. The consequences for teaching and learning are explored below.

5.4 Teaching and learning issues

This section describes the main teaching and learning challenges staff face as a result of the pressures discussed above. In the main, these stem from tensions between the teaching commitments of staff and expectations of them to be researchers. Staff need to respond to these challenges in an environment where class sizes have increased markedly and students' attitudes and expectations have changed. New IT applications are increasingly being provided by universities, but staff are hard-pressed to find the time to fully exploit the opportunities these systems provide. These factors combine to present Construction as an unattractive career and the difficulties managers currently experience when recruiting academics are likely to worsen in the foreseeable future.

5.4.1 Lack of time

Issues noted by staff included a lack of time to give students detailed feedback. In this connection, an exacerbating factor is the increased size of student cohorts. Some staff mentioned that they were able to enlist the help of others when assessing work, but such instances were by no means commonplace. The following comment from a student expands on this point:

> *Yeah but [by] the same token, on assignments you don't really get that much feedback either because it seems like once you hand [in] something it's just move onto the next. You know there's not much time to look back on what you've done I suppose.*
>
> *(Student Focus Group, C4, 2008)*

Staff also maintained that they had insufficient time to develop teaching materials. Many were frank in their comments, noting that research was more highly valued for promotion than teaching. As such, they felt they needed to strike a balance between their teaching and their research commitments.

> *Trying to get that balance, as [my colleague] says, is very difficult when the pressures are on you to produce, to publish, and to be members of committees, to interact with the community and the various professional bodies. It leaves very little time for. I know*

my teaching, and fortunately I have built up a number of years where I have got a lot of material. But if I was a new teacher I would find it extremely difficult to have enough time to build up that critical mass of really good teaching so I could take time in the other activities that the university is saying are very important too.

(Staff Focus Group, G2, 2008)

Staff also noted difficulties in finding time to arrange site visits. As mentioned (in Section 5.2.1) these were seen as being increasingly difficult and time-consuming to organise.

5.4.2 Skills not valued

Some staff noted that their skills as teachers were not valued for promotion. This gave them little encouragement to devote time to learning new on-line teaching and learning systems. This is pertinent if Construction disciplines are to exploit LMS. With more and more universities implementing such systems, on-line teaching has become a source of concern for some lecturers. Staff need to employ different teaching and learning strategies, and thus need to develop new skills and approaches. They need to be encouraged and supported to engage with these new technologies. Without this, it is likely that the uptake of online teaching and learning will not be speedy.

Furthermore, some staff commented that a completed PhD was more highly valued by many universities than industry experience, as staff with PhD and no industry experience tended to be employed in preference to staff with industry experience. However, possessing a PhD does not necessarily reflect teaching skills. By the same token having relevant industry experience is also no guarantee that such staff can teach. All members of academic staff, regardless of their background, need to be supported to develop expertise as teachers.

I think the thing is, if a person has a PhD then oh yeah they can teach; it's not right. You can't just have this blanket 'oh you've got a PhD so you can go off and lecture'. You know, I think universities are not saying it only in this University. I think all universities need to really understand that at some point there's the medium between an academic and someone who can come from the industry and actually teach better than an academic. Because sometimes an academic has trouble engaging and communication skills, because they are sometimes from another language, they've studied overseas and come here. Yeah, they are obviously very intelligent. But at the same time, as students, if we can't engage with them then how are we going to learn?

Interviewee

(Student Focus Group, F4, 2008)

It is clear that a key challenge for Construction providers (and arguably for the university sector) is to find a balance between teaching and good research.

5.5 Conclusions

This chapter has:

- Recorded the current profile of Construction academics
- Highlighted that staff feel pressurized, primarily because of their workload
- Identified a lack of resources in the disciplines
- Highlighted research pressures on staff
- Identified poor promotion rates of Construction academics

- Noted pressures on staff to secure research funding
- Noted increased administrative workload that academics need to accommodate
- Noted pressures staff experience resulting from increased student enrolments
- Recorded difficulties recruiting suitably qualified staff with relevant current industry experience
- Highlighted the lack of Construction graduates choosing to become academics
- Explored the employment of sessional staff
- Highlighted the need for academics to engage in industry-focused CPD activities

This leads into an evaluation of students' perceptions of Construction curricula. Do they align with the views of staff and their employers? These and other relevant issues are discussed in the next chapter.

6. STUDENTS

There has been a slow but consistent increase in the number of students enrolling in Construction disciplines at Australian universities over the period studied. This may be due to a range of factors, including growth in the sector and increased knowledge by students of the programs and career pathways on offer. This chapter outlines enrolments during this period to provide background to the circumstances disciplines currently find themselves in. In addition, it highlights trends which have occurred and which will contribute to shaping Construction disciplines in the future. These provide a context for a discussion about the issues facing Construction students. The chapter then considers university and societal pressures identified by students, including assessment, their age profile, and the pressures of working as part and full-time employees in the construction industry. The chapter concludes with a discussion about how the aforementioned factors affect students' learning.

6.1 Student profile

6.1.1 Student numbers

According to data provided by DEEWR there has been a gradual increase in student numbers across all universities at a relatively consistent rate over the past five years, as shown in Figure 6. As would be expected, there are variations in the distribution of these cohorts from year to year. It is evident that an increasing number of students are commencing Construction programs, compared to the overall numbers. It should be noted that these data relate to economic conditions before the current global financial crisis. Notwithstanding this, indications are that this trend will continue.

Figure 24 compares total student enrolments across each university delivering Construction programs between 2001 and 2006. These fluctuate from university to university and from year to year. Enrolment patterns are difficult to discern. Numerous factors are likely to have influenced these numbers including: fluctuating local demand for students; localised awareness of Construction programs by students; targets or caps on enrolments determined by individual universities; and so on. What is clear is that some universities have experienced extremely turbulent times. For example, the number of students at Curtin and RMIT has approximately halved between 2002 and 2005/6. UTS has also experienced noticeable fluctuations of students numbers. Other universities have had to respond to variations to a lesser degree. A desirable trait for a Construction program is agility, an ability to react quickly to changed demand for students. Resourcing such a demand must be challenging, especially when balancing conflicting demands of teaching quality and research excellence.
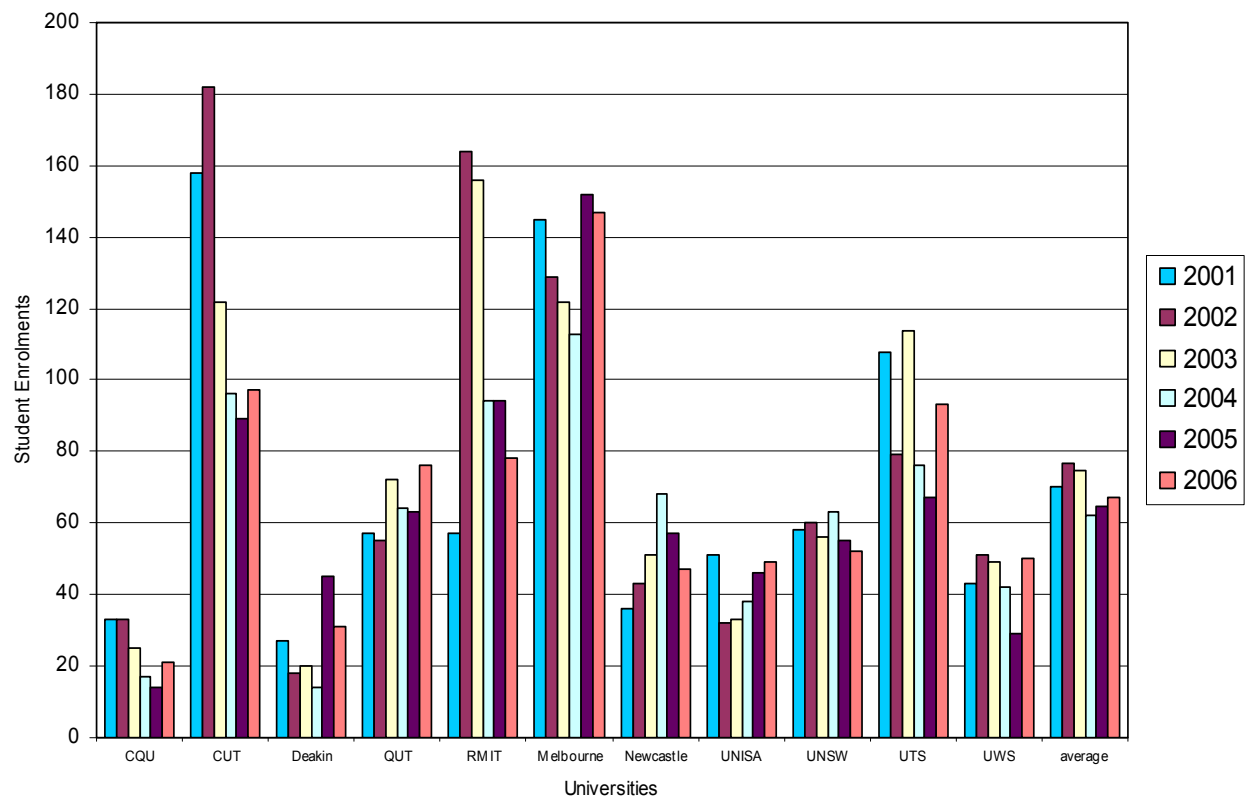
Figure 24: Total student numbers across universities (2001-2006) (Source: DEEWR)
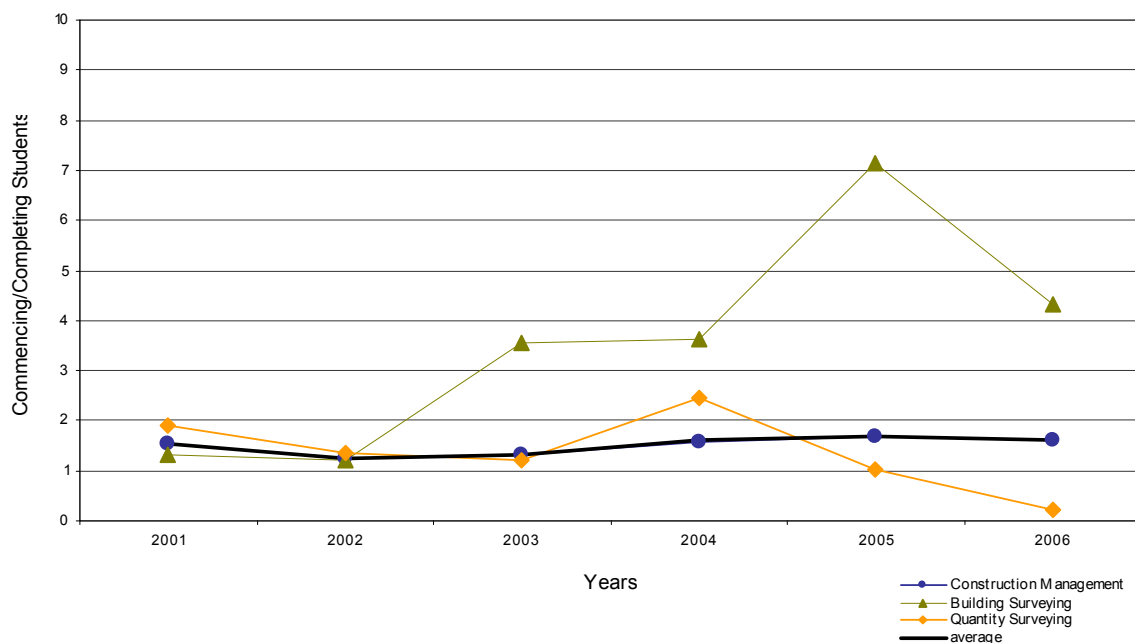
Figure 25: Ratio of commencing and completing Construction students (Source: DEEWR)

Figure 25 illustrates the ratio of commencing to completing students. A ratio of 1:1 indicates that students are graduating at a similar rate to their enrolments. Figure 25 shows that

construction management programs have graduated students at a consistent rate over the period 2001 to 2006. Outputs for building surveying and quantity surveying programs have been more volatile, although increases in available places could explain the fluctuations in 2005 (for building surveying) and decreases could explain the fluctuations in 2006 (for quantity surveying). Quantity surveying programs graduated students faster than they have been able to recruit them. It is clear that there is a buoyant demand for this profession, with students transferring to these degrees from other routes/programs. Conversely building surveying programs have graduated students at a slower rate than enrolments. According to Zillante (2007) this trend aligns with the current state of the building surveying profession in Australia. He notes that building surveying is facing numerous challenges:

> *The segmentation of the profession into specialist areas like Fire Engineering, Structural Engineering, Access Consultancy, Energy and Environment Specialists and various Performance Specialists etc means that the days of the generalist Building Surveyor are probably numbered. If in fact the profession continues to develop along these lines, then the Building Surveyor may well find him or herself simply acting as a collector of certificates from all the other new professions that will certify their aspects of the approval process.*

(Zillante, 2007:321)

Overall these data indicate a modest overall increase in total student numbers. However, there is strong anecdotal evidence that enrolments in Construction programs have increased markedly since 2006 (the most up-to-date data that DEEWR was able to provide was for 2006). Whilst the trends illustrated and discussed in this section show modest increases, it is highly likely that growth in Construction disciplines has been more buoyant than that shown. Many of the staff consulted for this study stated that there has been a significant increase in student enrolments and larger class sizes over the last couple of years.
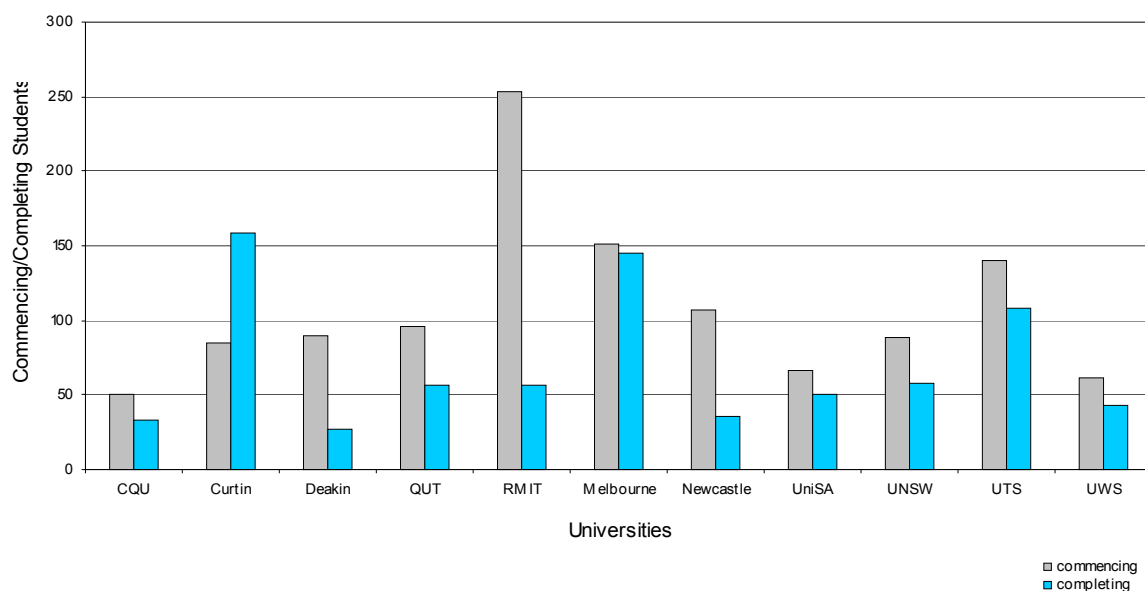
Figure 26: Commencing and completing students by university—2001 (Source: DEEWR) (Note: Curtin data inaccurate due to changes in enrolment)
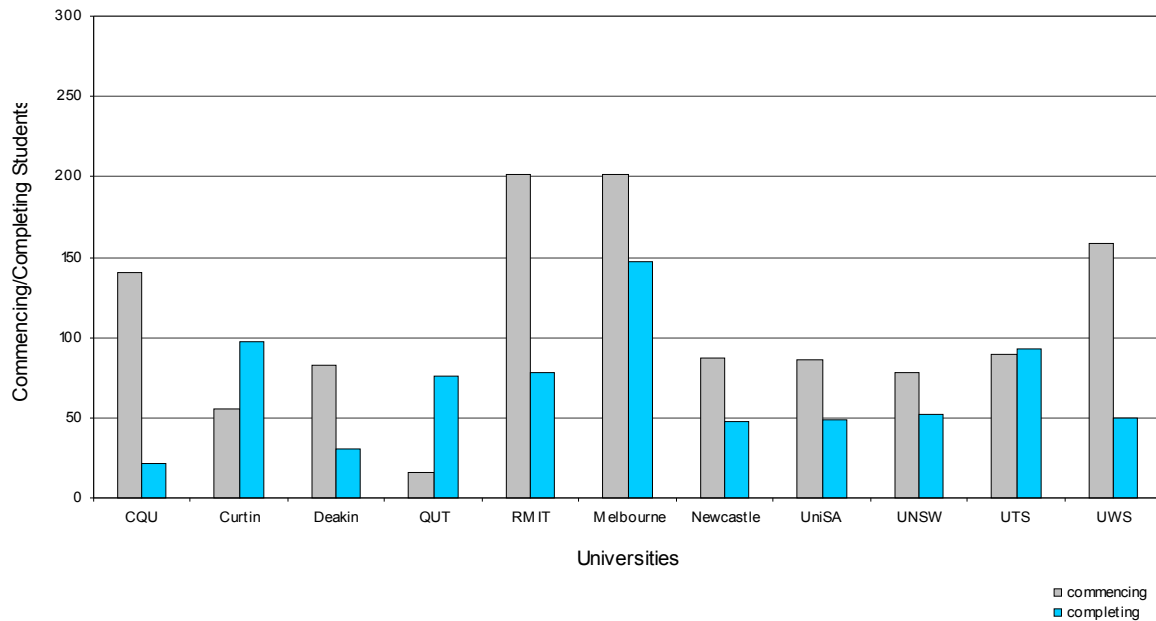
Figure 27: Commencing and completing students by university—2006 (Source: DEEWR) (Note: Curtin data inaccurate due to changes in enrolment)

Figure 26 compares commencing and completing students by university in 2001 whilst Figure 27 compares similar students and universities in 2006. In 2001, all universities except Curtin had fewer students completing their studies than were starting. This is symptomatic of growth, but the difference between these cohorts indicates that completion rates are slowing. This could be due to several factors including an increase in part-time enrolments, and students repeating courses before they graduate. Figure 27 shows a similar trend in 2006, with all universities except Curtin, QUT and UTS having more students completing their studies than starting. Clearly the overall trend is one of steady growth. However, the lagging rate of completions at some universities is concerning.

6.1.2 Overseas enrolments

Some universities are very successful at recruiting overseas students. Figure 28 provides data on overseas enrolments in 2006. It shows that RMIT is the most significant provider of Construction education to overseas students, followed by Melbourne. This trend confirms information given during interviews with RMIT staff who advised that student exchange programs with overseas universities are strongly encouraged and supported.
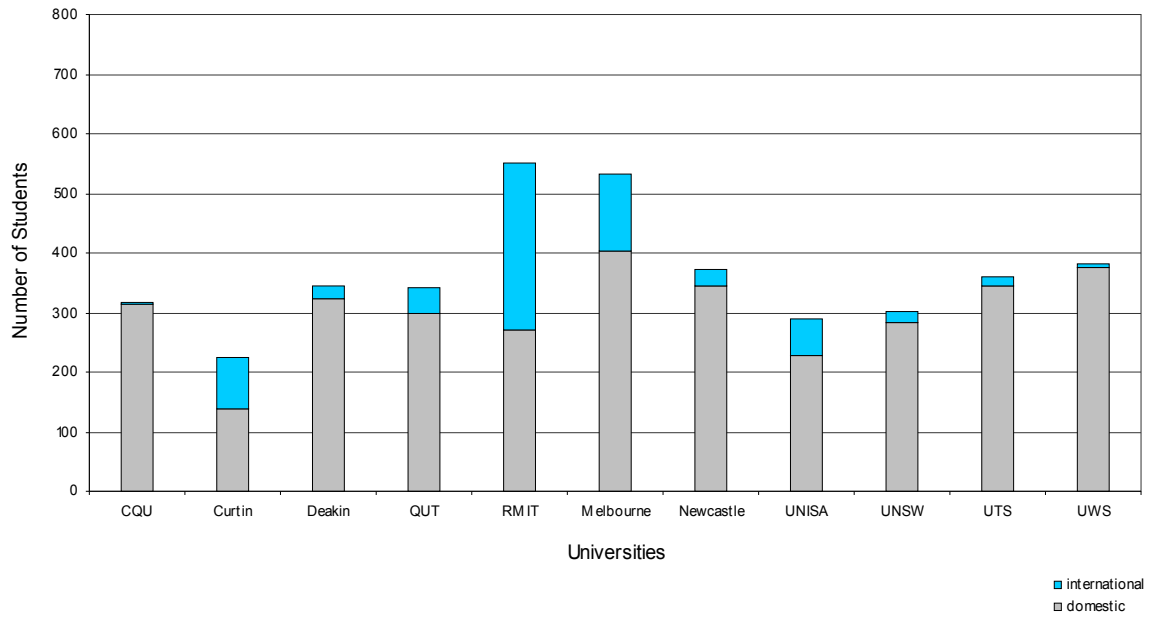
Figure 28: International and domestic student enrolments (on and off-shore)—2006 (Source: DEEWR)
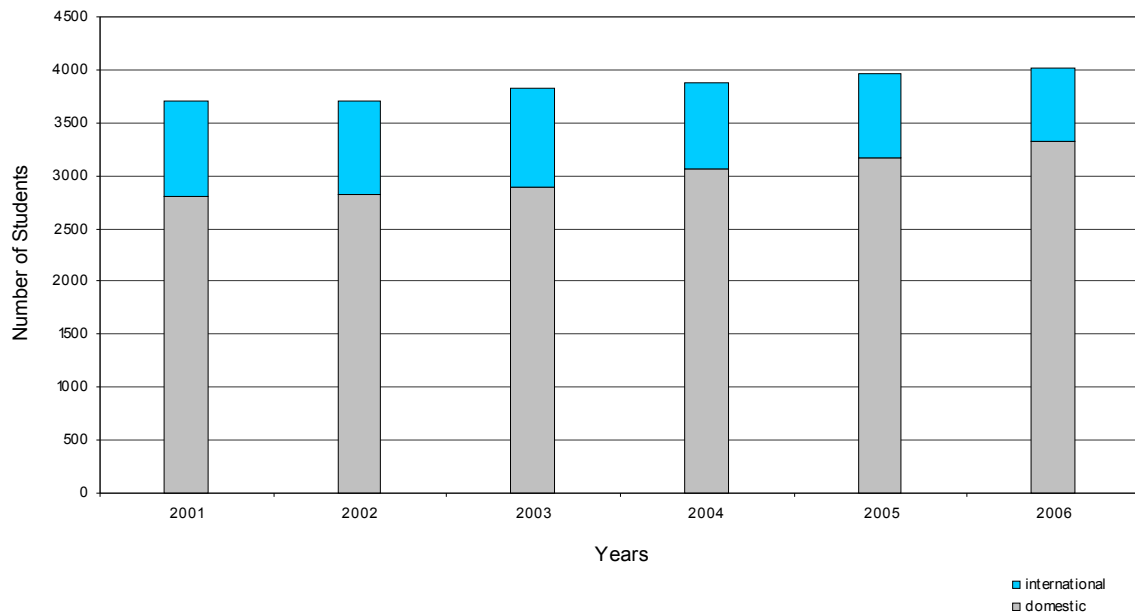
Figure 29: Total domestic and international students (Commencing, continuing and completing combined) — 2001 to 2006 (Source: DEEWR)

Figure 29 shows a decrease in overseas enrolments in the disciplines and an increase in domestic students. This situation is contrary to the view presented in discussions with staff who frequently mentioned that increased numbers of international students had been enrolling in Construction degrees.

6.1.3 EFTSL

This study found extensive evidence of students working in either part or full-time capacities whilst studying (See Sections 6.3.1 and 6.4.4 below). This is confirmed by the equivalent full-time student load (EFTSL) data provided by DEEWR shown in the figures in this section. What is surprising is the extent to which first year Construction students work and study. Figure 30 shows that these students take on a study load of approximately 80% of a full-time load. The reasons for this are likely to be numerous and were not investigated in this study. However, there are concerns about the level of responsibility given to Construction students. Anecdotal evidence suggests that some students are expected to take on responsibilities for which they are ill-equipped.
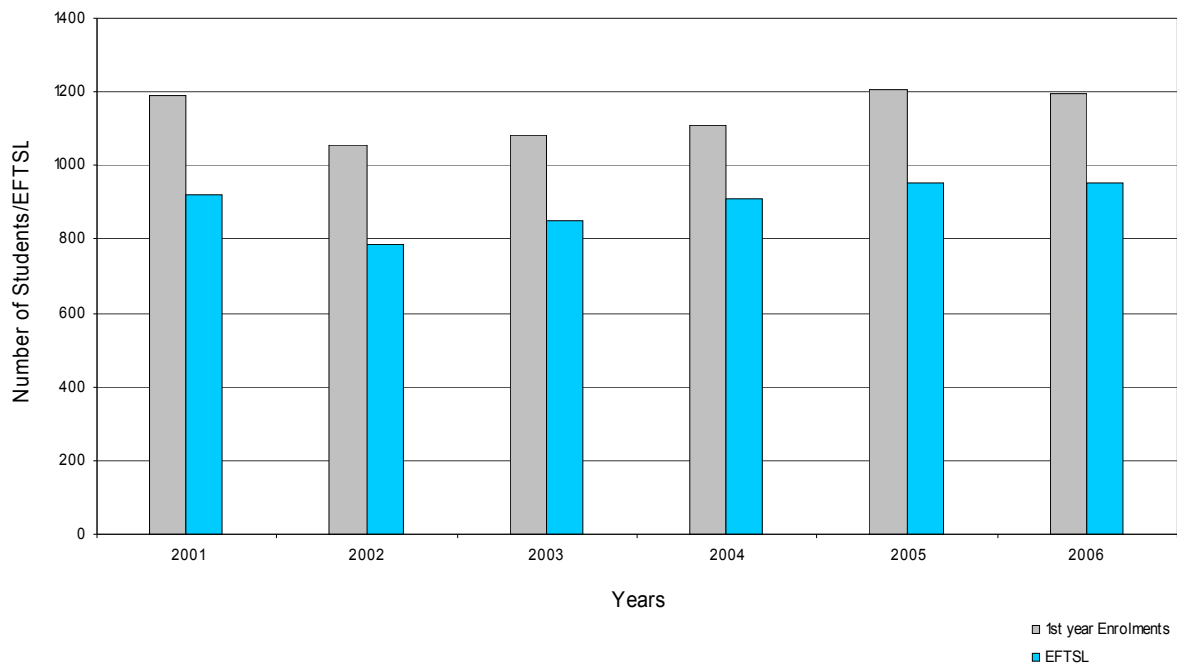
Figure 30: First year Construction enrolments as EFTSL—2001 to 2006 (Source: DEEWR)

6.1.4 Increase in Indigenous enrolments

There has been a slow increase in the number of indigenous students enrolling in Construction programs. DEEWR data indicates that the number of indigenous students has almost doubled during the period 2001 to 2006, with 12 students enrolling in 2001 compared to 22 students in 2006. Notwithstanding this, the enrolment of Indigenous students is very low, representing 1.8% of the total intake in 2006. Consideration should be given to initiatives which attract students from underrepresented populations.

6.1.5 Increase in female enrolments

The data presented in the figures in this section show that Construction disciplines are predominantly populated by males. This has been a long-standing trend and one which has been debated widely in the literature (London et al., 2007). This under-representation of females has implications for the disciplines, as potentially strong students are not being attracted to Construction. The sector continues to suffer from a lack of diversity (including low indigenous intakes). Figure 7 shows the gender of Construction students between 2001 and 2006, whilst Figure 31 shows gender for construction management students (17.3% female),

Figure 32 for quantity surveying students (17.8% female) and Figure 33 for building surveying students (16.2% female).

Unfortunately this trend is self-perpetuating. The construction industry has a gender-imbalanced employment profile and this discourages under-represented populations from considering Construction as a career. This issue needs to be addressed if the industry is to achieve equity in representation.

It is argued that women do not consider careers in Construction disciplines as they perceive them to be dominated by males (Fielden et al., 2000; Francis et al., 2004; Wilkinson & Morton, 2007). This trend is experienced in several other countries including the UK, as noted by Fielden et al (2000:115): "These problems [females not choosing construction as a career] have been isolated as being due to a number of factors including: the education process; image of the industry; recruitment practices; sexist attitudes; organizational culture; and working environment. What is clear is that not only is the construction industry the second most male dominated industry in the UK (after mining and quarrying in which no women are employed), with 84% of its workers male, but also it appears to exhibit the greatest degree of vertical segregation by sex."

Women who enter these professions do so for a variety of reasons. According to Francis et al. (2004:178) women "in male dominated professions, are often misunderstood, experience equity issues and face barriers to professional advancement and success". It is argued that "the industry is missing out on some of the brighter female students because of the perception that construction is a trade, not a profession" (Heathcote, 2007: 178).

Heathcote (2007) suggests that combining double degrees (e.g. construction management and business studies) could possibly draw more women to the profession. This approach could be expanded to include design disciplines such as architecture where there is the potential to provide high levels of credit and flexible career pathways for female students.
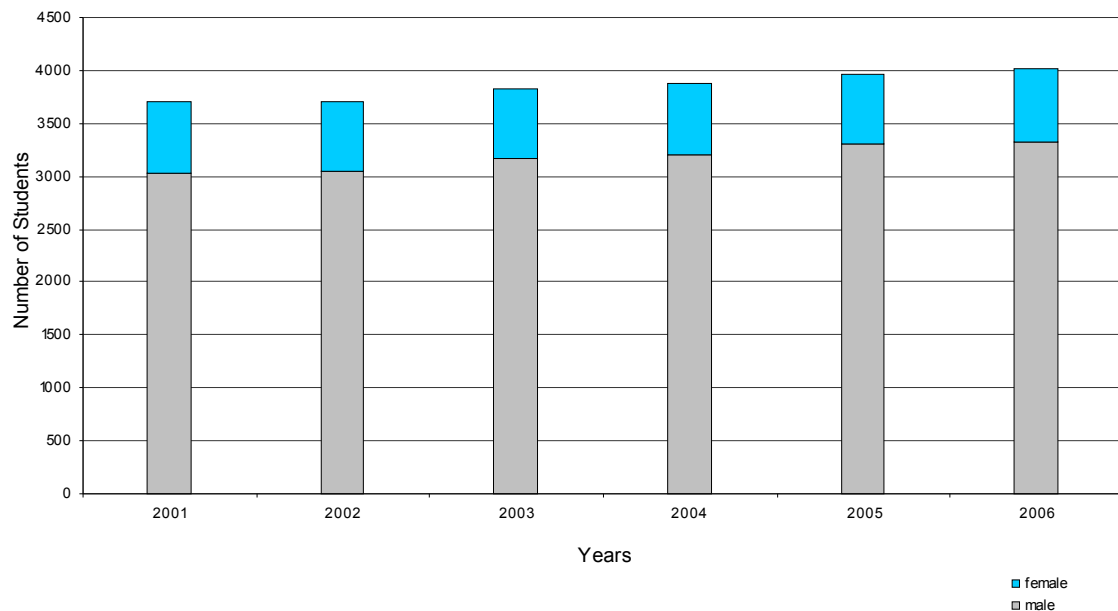
Figure 31: Gender of construction management students—2001 to 2006 (Source DEEWR)
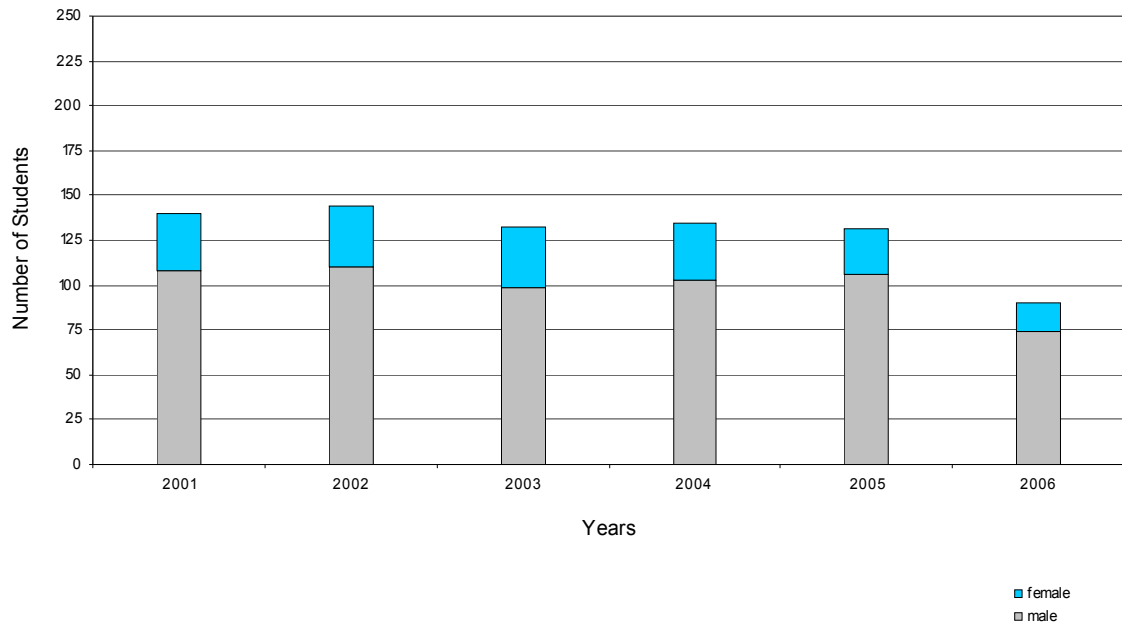
Figure 32: Gender of quantity surveying students—2001 to 2006 (Source: DEEWR)
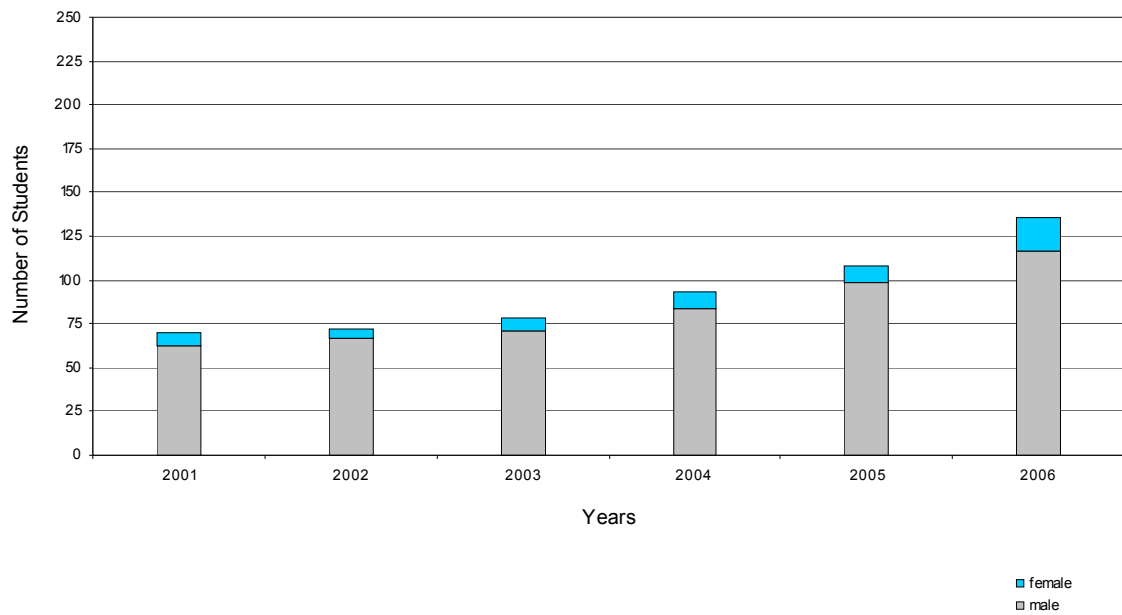
Figure 33: Gender of building surveying students—2001 to 2006 (Source: DEEWR)

The data presented in this section shows that there are continuing marked differences between female and male intakes into Construction programs. Construction staff are aware of the imbalance. The following quote describes a vision for the future of the disciplines:

What do you see in your crystal ball? What are the major changes that are going happen?

(Facilitator)

I'd like to see some more women in the class. If I can dream for a minute it would be a class that's more balanced in terms of gender. Other equity groups, Aboriginal, Torres Strait Islanders, international students—a wonderful reflection of society. It would be not so much sitting in classrooms—[it] would have lots of spaces where students could work individually or in pairs or in groups just for small periods of time . . . and so the content might be delivered . . . using online and short lectures and so on.

(Interviewee)

(Staff Focus Group, I4, 2008)

This report aims to implement solutions to the challenges defined in this quote. In the meantime, attempts have and continue to be made to increase the number of females enrolling in Construction programs. For example:

- The National Association of Women in Construction (NAWIC) provides support and scholarships for women in the field (NAWIC, 2008).

- The Royal Institute of Chartered Surveyors (RICS) recently published a report entitled 'Raising the Ratio' to promote the profession to women and to support women working in the industry (RICS, 2004a).

- The ALTC has recently funded a project entitled "Gender inclusive curriculum in Engineering and Construction Management". This project started in October 2008 and aims to "develop and promote a more inclusive style of teaching and learning in Engineering and Construction Management (E&CM) in order to accommodate the increasingly diverse student body" (J. Mills & Gill, 2008:1).

Figure 26 and Figure 27 present noticeable differences between the numbers of students starting their studies and those graduating. This may be linked to various characteristics of current student cohorts. Various authors (Aman et al., 2007; Kogan & Hanney, 2000; Little et al., 2003; A. Mills & Ashford, 2004; Robin & Martin, 2000; Star & Hammer, 2008; Werner, Hudson, & Hadgraft, 2007) data elicited from staff in this study) argue that students are perceived as not motivated to achieve high grades, being satisfied simply to pass. These characteristics are discussed below.

6.1.6 Age profile

Construction students are drawn from many age groups. Unfortunately DEEWR does not provide data on the age demographics of students, and these were not elicited for this study. The observations in this section rely on anecdotal evidence of the age of these students.

Mature age students

A distinguishing feature of these disciplines is that they have a high intake of mature age students. Many are tradespeople who wish to progress their careers. Some have completed TAFE qualifications, whilst others are changing careers. These students find themselves in cohorts of (sometime much) younger school-leavers. Such a juxtaposition of generations provides opportunities and challenges for staff and students to exploit and/or grapple with.

Generation Y

During interviews and focus groups a significant number of staff identified marked changes in the attitudes and behaviours of current cohorts of students compared to those of some years ago. They observed that the students they were teaching now demonstrated markedly

different characteristics to students from previous times. Staff felt that they needed to relate to a new type of student and described frequently experienced behaviours such as:

- absenteeism
- being easily distracted by technology
- not listening to or learning from lectures
- expecting to be 'spoon-fed'
- seeing education as a commodity
- not valuing knowledge
- being motivated to learn to earn money rather than to gain knowledge
- wanting to be entertained
- being computer orientated
- wanting to do the bare minimum
- wanting to complete their degree quickly so they could start work

The on-line survey provided a similar range of responses. The following are some examples of the postings staff made in response to this issue:

- *They expect an easier pathway through their course*
- *They are more consumer orientated and less interested in the intrinsic benefits of learning*
- *They are outcome driven—a degree is simply a means to an end*

(Online Survey Responses, 2008)

Staff felt that these behaviours were markedly different to those of previous generations they had taught. The current generation is termed "generation Y", being students who were born between 1978 and 1994. These observations align with those of Sheahan (2005), who noted that gen Y were street smart, aware, lifestyle centred, independently dependent, informal, tech' savvy, stimulus junkies, sceptical, and impatient (Sheahan, 2005).

It could be argued that these characteristics are not peculiar to generation Y students, as other societal factors might also have influenced them. For example, traditional notions of universities as elite entities have changed largely as a result of moves to an 'information society', changes in university policies, and increased numbers of full-fee paying international students (Star & Hammer, 2008). Consequently universities have taken on new roles which have a "more vocational, mass educational focus, with universities playing a central, if vexed, role in the formation of professional, white collar employees" (Marginson 2000:98 cited in Star & Hammer, 2008). This has resulted in a shift to more generic curricula and increased class sizes (Star & Hammer, 2008). As a result of this shift, it could be argued that students' attitudes have changed too, to that of 'paying customers'. There is now "an increase in student expectations of teaching quality and learning support from universities" (Star & Hammer, 2008:238). This is aptly summarised in the following extract from an interview with a member of staff:

> *I think that's a worldwide trend; I don't think it's just our students. Students have also said to me that, with the massification (sic) of education, having a degree alone is not going to differentiate you in the workplace. It's no longer what it was 20 years ago where if you had a degree you were differentiated, particularly in construction. That no longer occurs because everybody applying for graduate jobs has a degree in something. So there's less incentive to be enthused about it. I think that there's a*

great incentive to just get through. I think that that's part of their attitude but, once again, I don't blame them for that.

(Interview, Course Coordinator, L2, 2008)

Furthermore other changes in university structures and societal pressures may have influenced students' behaviours. Social factors that may have influenced students include society being consumer driven, materialistic and changing from being collective to individualistic. This is reflected in the following quote:

And we have moved from a collective society to an individualistic society in Australia . . . You can't expect students to be collective when the whole society is individualistic. So how much we can expect to be collective in a university is really a question, because everything is individualistic now; performance is individualistic, everyone wants to excel personally.

(Interview, Programs Coordinator, A2, 2008)

However, categorising changes in students' behaviours is complex. There will always be some students who are difficult to categorise. Staff noted that there are always keen students who wanted to learn. For example:

But do you find those ones who are keen to learn will come, and the average ones will drop off from the face to face learning? That's what I've found. Distinction students will always stick around to listen to you.

(Staff Focus Group, A3, 2008)

Furthermore, some mature-age/distinction students also expressed their frustration with students who, for example, interrupted lectures to ask questions that were already explained in course outlines.

Some staff noted that the design of curricula and courses might in fact encourage generation Y attitudes in students. For example:

We're leading them down a path of constantly waiting for our answers too, instead of showing some sort of initiative of discussing amongst themselves.

(Staff Focus Group, A3, 2008)

The general view of most staff was that students' engagement in higher education has changed appreciably. Some of the negative characteristics of generation Y students include poor attendance at lectures and tutorials, and little evidence of deep learning. Many staff had mixed reactions as to how to address current student behaviours. Notwithstanding curriculum design and societal pressures, generation Y attitudes provide a significant challenge to Construction staff. Clearly new ways of engaging students need to be identified but little evidence was found of progress in this regard. Where there was evidence it was scattered and seemingly without a coherent implementation strategy. For instance, some staff discussed having meetings with colleagues to work out new ways to deal with students (including whether changes were needed to curricula, and implementing new ways of teaching and learning). There was evidence of timetabling of exams being altered to allow students to meet their paid work commitments, as illustrated in the following quote:

Our exams are not in the exam period—they're just done in class. We want to come in the door and then go out, make some money, get some work.

(Student Focus Group, D3, 2008)

The challenges of addressing generation Y attitudes are dealt with in Section 6.4. Other pressures which may exacerbate generation Y behaviours (such as absenteeism, lack of concentration, and achieving low marks) include coping with large class sizes, and time management (e.g. submitting assessment items on time, and balancing day-to-day work/social commitments with university timetables). These as well as the impact of students working in industry are discussed later in this chapter.

Net generation

Several members of staff mentioned that they did not have time to revise their curricula due to their high workload and lack of access to resources (as discussed in previous chapter). The following quote encapsulates the staff situation in relation to this:

. . . the quality is also affected by, I guess, the amount of resource that the university can give to the teaching these days. Because we are, over the last . . . five or ten years the course has been restructured a number of times so that the number of units offered has become less and less and then each unit becomes bigger and bigger like a whole mixed bag of everything within one subject. I don't know that that really serves the purpose but that seems to be the trend.

(Interview, Course Coordinator, K4, 2008)

This quote indicates how changes influence staff workload, resources and course delivery, all of which impinge on the time staff have to devote to curriculum renewal to suit NetGeners.

Comments made by staff concerning the impact of the Internet on current intakes of students are supported by literature. Barnes, Marateo and Pixy Ferris (2007) cite Bonamici, Hutto, Smith, and Ward (2005) who claim that the current (Net or 'Internet') generation is unique in that it is the first to grow up with digital and cyber technologies. They observe that not only are NetGeners acculturated to the use of technology, they are saturated with it. By the time s/he has reached 21 years of age, the average NetGener will have:

- (spent) 10,000 hours playing video games
- (written / responded to) 200,000 e-mails
- (spent) 20,000 hours watching TV
- (spent) 10,000 hours on cell phones
- (spent) under 5,000 hours reading (Barnes et al., 2007)

The last point warrants further consideration. It became evident during the interviews and focus groups that many lecturers teaching Construction courses are misinformed about their students' reading habits. If Barnes et al.'s (2007) data are indicative of Australian university students, lecturers need to recognise that the skills students enter university with are evolving and that many are used to and prefer digital materials rather than paper. In addition, they are accustomed to the interactive nature of Web 2.0 technologies, and expect to be able to interact with Internet content. However, it appears that some staff may be structuring their teaching based on traditional learning preferences rather than those of NetGeners.

This section has provided an overview of the characteristics of Construction students and the responses of academic staff to their students. Over and above the pressures these students face as individuals, they also face other significant challenges including those from university, industry and society. These are addressed in the following sections.

6.2 University pressures on students

Students identified several pressures and challenges in the ways universities administered their studies. These included assessment items, group assessment, obtaining feedback, coping with large classes and timetabling of their activities.

6.2.1 Timing of assessment items

Students noted that the scheduling of hand-in dates for assessment items was sometimes problematic. They observed that assessment items for different courses were frequently scheduled for hand-in within a short space of time, and argued that allowing time between submissions would allow them to focus their efforts more productively. This indicates issues with the management of assessment items (although this was not apparent at all universities). When this occurred it was for assessment items that were timetabled in isolation and without consideration of deadlines at program level. This seems to apply to students following multiple pathways through programs, being part-time or having failed a course and therefore not following a standard pathway. However, some students felt that working to simultaneous deadlines was a positive experience as it forced them to develop time management skills and strategies. They commented that working to these deadlines related to the time pressures they were likely to face in industry:

> *Like one of my classes I have assignments due every week whether they're small or big and another class I have nothing due until the end of the semester and then an exam. So it's all about time management which is like the key thing in our industry. So I guess it's good in that respect.*
>
> *(Student Focus Group, B3, 2008)*

Arranging assessment submission dates for all the courses that students take in a semester so that none clash is the 'holy grail' for lecturers. It is likely that hand-in dates will tend to congregate towards the end of teaching periods because this is when the bulk of the course content has been delivered. Many staff members argue that this is an appropriate time for assessment items to be completed. Notwithstanding these sequential challenges, staff need to note these concerns of students.

6.2.2 Nature of assessments

An issue identified by students was that some teaching and learning approaches used in their courses were dated. They were critical of "traditional" approaches to some teaching, learning and assessment. Comments relating to assessment included:

> *I just don't like exams. I think exams are so 1930s. I just think that every two or three weeks there should be an assessment, assignment or a test worth 15 or 20 per cent. I think that's going to work a lot better than cramming. Because some people really are very good at rote learning and will nail an exam, but know nothing three days later. Then some people will study, like myself, very hard for it and never really nail an exam, but seem to do really well on the assignments. I just think that the whole exam process is outdated.*

I'm one of those people who can just memory dump on an exam and walk out four days later and not remember anything. I know what you're saying is right, because at the end of the day I probably don't know as much as I should. I think that you're right. I think that you can't have subjects . . . like Structures that we have, it has a 70 per cent exam, but that is a lot. You know, you sometimes see students who do so well on the assignments and then you hear that they didn't go so well on the exam. You kind of think well there probably is an issue there, because you know that student would have studied. So yeah, I think that they should put less of an emphasis on the exams, especially in the subjects that are really core to our course, like Structures.

(Interviewee 2)

(Student Focus Group, F4, 2008)

It is clear that students have expectations of their education that are in some cases not being fulfilled by traditional delivery approaches. Moreover, it is evident that students appreciate the differences between rote and deep learning. If Construction staff are to engage students, an effective strategy would be to employ best practice teaching and learning approaches.

6.2.3 Group work

Another area specifically commented on by students was related to group work and associated assessment items. Universities, students and employer groups are unanimous in calling for more group work to be delivered in professional programs. From a pedagogical perspective it is a core skill for all professions. Construction graduates are expected to be able to collaborate effectively in teams. However, some students felt that group work was frustrating (see Hardie, 2007 for suggested solutions to these issues) and primarily a strategy their lecturers used to reduce the number of assessment items they had to mark. Indeed staff also discussed this process as illustrated in the following quote:

Most of the assignments are done in groups, only because it cuts down in the marking time. That creates its own problems. Especially first years because this is essentially (their) first time working in groups I would imagine. You get heaps of complaints, so-and-so has dropped out or so-and-so is not pulling their weight.

(Interviewee)

(Staff Focus Group, L4, 2008)

Furthermore, many universities are increasingly requiring that each member of a group be assessed separately (instead of being given an overall group mark). Discussions with staff showed that some were implementing such procedures, as indicated in the following quotes:

In my project I have individual components and there's a group component which means everybody has to contribute. And there's always . . . a certain task a student must do on an individual basis. This I teach in like the structure or construction technology assignment and they lay out the design or the calculations out of the things and I ask them to do it as an individual effort rather than a group effort, so that I will group assess and then the individual's assessment.

(Interviewee 1)

There's always a separate group and individual. And I think the university has a policy that there shouldn't normally be anything more than 30 per cent that's group assessment.

(Interviewee 2)

(Interview, Program Coordinators, K4, 2008)

Assignments incorporating group and individual assessment promote learning as formative and summative activities. Some members of staff noted that they supplemented group marks with elements of student peer and self-assessment.

Interview and focus group discussions with Construction staff and students identified issues with the assessment of group activities. For example, students discussed having large amounts of collaborative group work in their programs. They also commented that there were occasions when their fellow students had not 'pulled their weight' in assignments, as illustrated in this quote:

Do you guys find yourselves doing much group work?

(Facilitator 3)

Yeah I hate it. I can't stand it. It stinks.

(Male 1)

Why don't you like it?

(Facilitator 3)

Group work is just so hard to—I know that when you work out on the site, on the job, you have to work with people blah blah blah. But it's just hard to get people to get up, it's hard to find the time to get people together when you're at university where no one's ever here at certain times and then all of a sudden you're arranged to meet and he doesn't come.

(Male 1)

(Student Focus Group J4, 2008)

The discussion above highlights the difficulties students experience trying to manage group assignments. Similarly, staff also noted difficulties in administering these assessments. Despite university directives that group assessment should incorporate elements of individual assessment, it was found that some schools have not responded to these calls. A reason offered for this was that universities, employer groups and students want individual grades but Construction academics typically have not been assessing group work in this way. This may be partly because of the inherent difficulties in facilitating group work effectively. This is illustrated in this quote:

Do you teach the specific skills related to carrying out online teamwork or do you expect them to have picked it up? 'Cause I understand that you make them work as groups online but do you actually—do you find that you're teaching the skills [to students] required to effectively work online at all?

(Facilitator 2)

If we knew what those skills were we'd teach them. I think what we do is give instructions. Organise your group like this, get it together this way. And then we have the assessment thing where each person in the group assesses the other people. There's a feedback mechanism there so that there's a certain amount of accountability involved in the whole thing. That's why group work's always a two-edged sword. It's

not easier to monitor. It's not easy to make sure it's fair for everyone. There are how do you put it—unscrupulous students who will take advantage of it.

(Interviewee 1)

(Staff Focus Group, J3, 2008)

This quote encapsulates feelings of frustration associated with the complex processes of group and peer assessment. It applies to staff and students alike and may be compounded when peer and group assessment is conducted using a LMS (such as *Blackboard*).

Challenges related to group work include providing feedback and managing large class sizes. It was apparent from discussions with staff and students that group work is an area that needs to be addressed in both its implementation and management. Staff acknowledged the need for resources to support them in implementing this assessment strategy.

6.2.4 Feedback on assessment items

Another issue identified by students relating to assessment was that of the quality and quantity of feedback received on their assessment items. Students valued critical comments that provided formative feedback and indicated where they had made mistakes and how they could improve their work. The following quote illustrates the concerns students had over this issue and is representative of the student focus groups:

I just think sometimes there's a lack of consistency and that really frustrates me for obvious reasons.

(Interviewee 2)

Yeah, I guess you just need feedback.

(Interviewee 1)

Yeah, good feedback.

(Interviewee 2)

Consistent feedback.

(Interviewee 1)

When I was at another university all of my assignments came with a sheet on the back. There would be notes throughout the assignment and then there would be a detailed commentary on what you'd done right, what you needed to work on . . . With this [course], you're lucky if you get a tick on the page for doing it right and your mark on the front page for a lot of subjects and how can I learn from this? If I've done it well obviously I know to do the same thing again but if I haven't, I just don't think it's good.

(Interviewee 2)

(Student Focus Group, B3, 2008)

Students also asked for feedback to be provided in a timely manner. Some requested feedback during the preparation of their assessment items, rather than later on (i.e. when their work had been formally assessed and they had no opportunity to address shortcomings). These issues relate to staff workload already discussed in Chapter 5.

Feedback on assessment items was of concern to students and staff alike. Staff felt that to provide the level of feedback required by students was beyond their capacity. Conversely, students felt that they were missing out on important learning opportunities. In this connection, there is considerable scope to support staff in developing strategies that provide effective and timely feedback.

6.2.5 Large class sizes

The large class sizes which many Construction courses currently attract result in a high workload for staff. Many lecturers say they do not have time to meet face-to-face with students to provide feedback. For example:

> *. . . with the combined cohorts—it's 200 plus students. You almost think, wow, I'll just give them one assignment or two assignments. You're really looking at the numbers on that, because you just don't have the time. If you look at hours, 220 assignments— if you have no marking assistance, and that has happened in the past. And let's just say an hour, that's 220 hours.*
>
> *(Interviewee 3)*
>
> *I have gone through and done track changes, but then I usually just extract the comments from the assignment into the feedback sheet.*
>
> *(Interviewee 2)*
>
> *Ten years ago, I would have had a hard copy, written a comment on the page, a bit more of a conversation with the student. Now it's the feedback sheet and more general . . .*
>
> *(Interviewee 3)*
>
> *You've actually cut back your comments?*
>
> *(Interviewee 2)*
>
> *You have to, because of the number of students. But the expectation is high. They want comments. And they are entitled to them. We'd like to have a class of 25 where we could do that.*
>
> *(Interviewee 2)*
> *(Staff Focus Group, A3, 2008)*

This focus group discussion illustrates how the provision of meaningful feedback is further complicated by the increased assessment workload resulting from large class sizes, and the consequent impact on students.

6.2.6 Timetabling

Staff discussed cut-backs to administration and support staff (See Section 5.2). These have resulted in pressures which have had an impact on students, staff and industry. Timetabling of lectures/tutorials was one of the causes for concern:

> *We used to control our timetabling within the school and we could do single day block-releases which worked really well. We cannot do that in a university this size now, so they get classes, largely, wherever. The industry does not like that but there is not much we can do about it. That is probably the biggest complaint, I think, their [industry] access to the students' capabilities during the four to six years of their program.*
>
> *(Interview, Head of School, C1, 2008)*

Students similarly noted their concerns about class times. As discussed in Section 6.3.1, many Construction students are employed on either a part or a full-time basis. Having to attend classes at different times frequently causes clashes with workplace commitments. One staff member observed that students would frequently change their subject choices to suit the requirements of their employer. This conceivably means that students may not be enrolling in courses in an optimal sequence, and this in turn may influence their motivation and behaviour.

However, not all participants were critical of course timetabling. Some embraced working in industry in the daytime and attending classes in the evening. This is a tried and tested approach that Construction students and education providers have pursued for many years, and is illustrated in the following quote:

(Does a) late night timetable for class work for you?

(Facilitator)

I suppose it works both ways really: students can work and lecturers can come from industry after work. You can see that has been evolving, and over the last three years that has been happening more and more.

(Interviewee 1)

So you're still getting the industry-experienced staff who are visiting not actually university employed?

(Facilitator)

I suppose our industries have a long history of people doing night school. That's the way like that's what a lot of the carpenters and all the chippies did. They did night school for so many years, or they did surveying at night school for six years, because a lot of my bosses were like that. It's a hard-working industry. Like, you know, sometimes you start on site at 6:30am and you don't end your day until 8:30pm because you've gone to night school.

(Interviewee 2)

(Student Focus Group, F4, 2008)

This section has highlighted key issues of concern to students including timing of assessment items, group work, assessment feedback, class sizes and timetabling. Some have argued that some of these challenges (e.g. having to attend lectures and tutorials at inconvenient times and submit assessment items to tight deadlines) prepare them for the world of work. There they will need to work long hours and be prepared to put in extra effort to meet deadlines. However, the quality of the programs and the learning they deliver may be compromised unless steps are taken to alleviate these concerns.

This discussion has also identified external university pressures on students which influence their behaviour. Furthermore, the construction industry has high expectations of their student workforce. These industry and societal pressures are discussed below.

6.3 Industry and societal pressures

The construction industry has an understandably large influence on universities' Construction programs. These need to address two potentially conflicting requirements. They need to be vocationally focused and prepare graduates who have knowledge, skills and attitudes consistent with a university professional program and who are capable of taking on leadership roles in industry and society. In addition, the programs need to adopt flexible structures and allow students to work whilst studying. Indeed, accreditation requirements mandate periods of industrial experience. The manner in which Construction programs provide and facilitate contact with industry vary from university to university. Staff opinions as to the importance of various elements of a university education are provided in Figure 34. This figure shows that most staff regarded involvement in industry as an integral and vital element of a Construction student's education.

Figure 34 summarises responses from staff to the online survey question "How important are issues related to students' interactions with the curriculum?" A high proportion of staff

indicated that it was 'very important' or 'extremely important' for students to have industry involvement, relevant industry experience and to visit construction sites. However, these activities create significant challenges for all involved. Balancing study and work requires effective management on the part of all concerned. It is also necessary for students to link their industry experience with their formal education. Making such connections between learning activities needs to be facilitated by Construction lecturers. Work Integrated Learning (WIL) is a key area that provides considerable scope for further development in Construction programs.
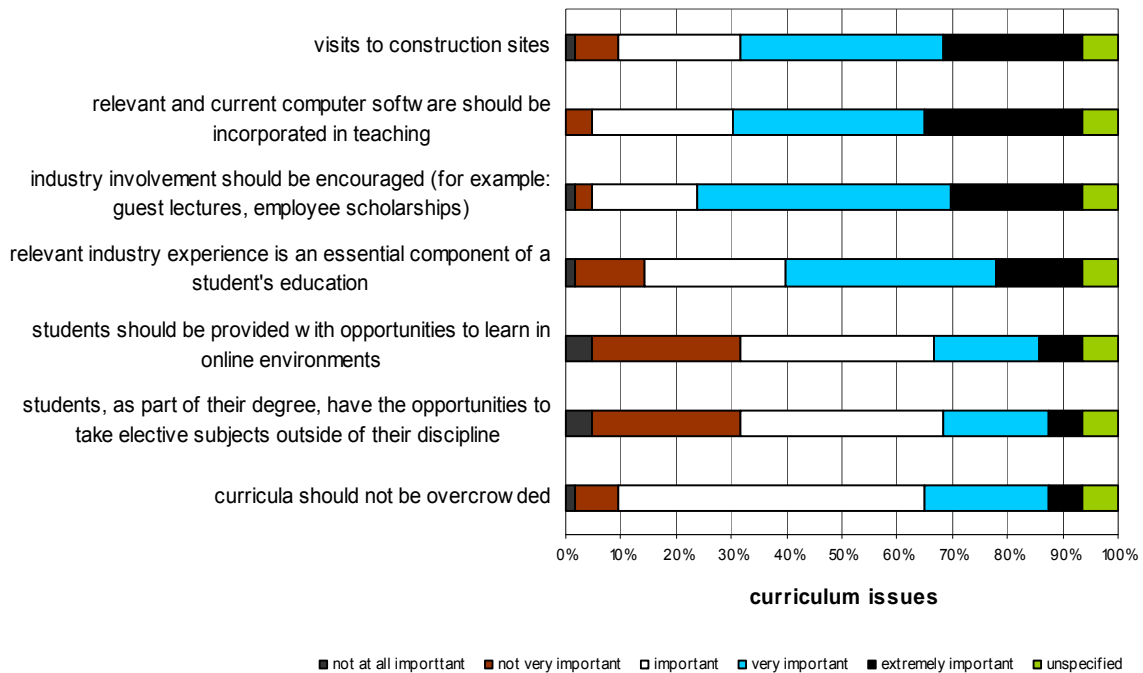
Figure 34: Staff views on the importance of students' interactions with curricula (Source: Online survey)

6.3.1 Working whilst studying

Working in the construction industry at an appropriate level can provide a positive experience for students as it provides a learning opportunity within the context of their chosen field of study. However, working full-time can have a negative impact if students choose to overload their studies. Students' workloads and the pressures these generate are issues of concern identified in this study.

Many of the students who participated in the focus groups said that they worked and studied full time. For example:

> *So the vast majority of you have part-time work. Hold up your hands when I say the closest number of hours a week that you work in the part time job? Five? 10? 15? 20? Any more than 20? So it works out about a third do 15, a third do 20, and a third do more and there's 28 [students] in the room.*

> *(Facilitator)*

> *(Student Focus Group, D3, 2008)*

However, it should also be noted that many students did not see working and studying as problematic provided that good time management was exercised as illustrated in these quotes:

I don't find working a burden upon my studies at all. It just comes down to time management and I work about 25 hours a week and study full time and I've got no problem. I've still got plenty of time to do other things.

(Interviewee 1)

Yeah, it's all about balance. Balance is the key.

(Interviewee 2)

(Student Focus Group, B3, 2008)

Do you ever miss classes?

(Facilitator)

. . . there's times where you don't have any other choice, it's a bit unfortunate, but you have to miss classes. Say if you've got a meeting or something with professionals and that's set at a set time. Yeah, some things get missed . . . But I don't have any trouble with any of that so.

(Interviewee 1)

(Student Focus Group, C4, 2008)

. . . I work full time as well and like I know a few people that said "Oh it's getting to me, it's getting to me"—but they're doing four classes and they're working full time as well . . . yeah, so [they are] doing two full times at once; it's nearly impossible . . . I do three subjects and a fulltime job and that's enough just to keep me busy. Like I'm just scraping through, passing always but like I'm finding with my assessments and everything I just pass through.

(Interviewee)

(Student Focus Group, K3, 2008)

The amount of work which students engage in warrants further discussion. Figure 35 indicates that the extent to which students are enrolling on a part-time basis has remained relatively consistent during the period studied. Figure 35 also shows that many students are ostensibly engaging in a significant amount of work outside of university. Many of these are employed full-time, and many are studying full-time as well. It is therefore readily understandable that students have concerns about timetables and hand-in dates for assessment items. They are clearly trying to manage onerous work/study commitments.
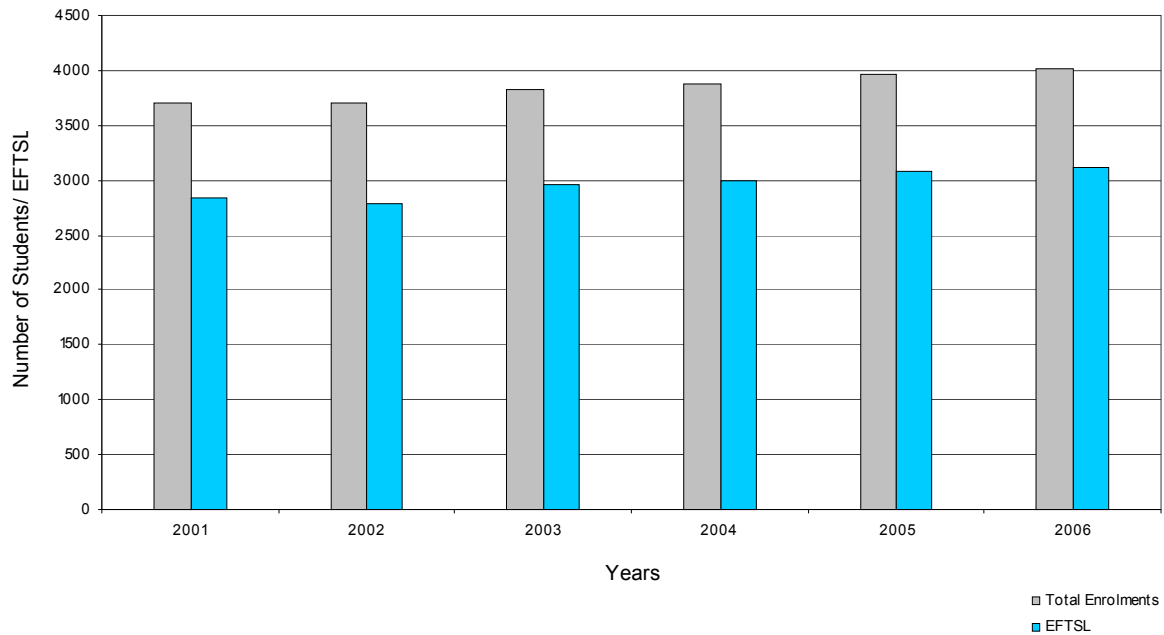
Figure 35: Total Construction enrolments and EFTSL (2001–2006) (Source: DEEWR)

With respect to the building surveying and quantity surveying professions, Warren et al. (2005) confirm that there has been an increase in students' work-based learning and part-time study. Students working whilst studying in Construction disciplines has also been explored by Ashford & Francis (2007b) and Mills & Ashford (2004). They observed that students currently take on more paid employment whist studying than in the past (Ashford & Francis, 2007b; A. Mills & Ashford, 2004). This is increasingly apparent in these disciplines as there has been a tendency for industry to employ students as soon as they have completed some of their university education.

Whilst acknowledging that individual time-management skills vary, students who work and study full-time generally experience difficulties balancing these activities. They tend to relegate university activities and assessment tasks to second place when faced with demands from their employers. Mills and Ashford (2004) found that students could accommodate their work responsibilities whilst studying though some were "unclear about their obligations to the university, and tend to spend less time on tasks that improve their learning experience" (McInnis 2003 cited in A. Mills & Ashford, 2004:197). The impact of working whilst studying is considered further in Section 6.4.4.

6.3.2 Shorter Construction degrees

It is also relevant to note that several students expressed interest in completing their degrees in less than four years. They saw shorter degrees as a route to being able to get into industry quicker. This indicates a pragmatic view amongst students toward their education. They want to graduate as soon as possible, and do not see the relevance of some of the courses that are included in their curriculum.   The following discussion is between two students who are working full-time in industry and studying part-time:

> *I think in a way if you're in our situation [working in industry] there could be the option of shortening it, taking out a few subjects like the stuff you're going to learn from on the job practice type thing so that would be very handy because when you're in our*

situation you stay part time from the start but it ends up dragging out to about six years.

(Interviewee 1)

It's a long time.

(Interviewee 2)
(Student Focus Group, C4, 2008)

These examples show that working whilst studying is becoming a significant challenge for students (and staff). It has the potential to influence learning and the skills students develop. Working and studying also comes at a cost as Lingard et al. (2007) noted in their study. They observed that construction students in Australia and Hong Kong became exhausted and found that in their Australian sample, "tension rose as [there was an] inner-role conflict between paid work and study" (Lingard et al., 2007:355). However, many of the staff who participated in this study are yet to adapt their teaching to these changed realities. Many also expressed their frustration at poor levels of attendance at their lectures and tutorials. This issue needs addressing by universities, industry and students. Some recommendations are made in this regard in the following chapter.

6.3.3 Lack of industry appreciation

Both staff and students stated that industry has little appreciation of the challenges students face when working and studying. Industry was seen as a powerful force which was motivated by the current skills shortage. Furthermore, it was seen as generally unsympathetic to students' study commitments. It appears that few employers facilitate their students taking an active role in their university studies. However, some participants noted that this was slowly changing.

My criticism of them is that industry, as far as I'm concerned, treats them as fodder— recruiting fodder. And I think it would be a much healthier relationship if there was a stronger R&D linkage. The building group has very few PhD students, very little background in research activity. That's changing dramatically and partly because of the university and partly because of me. But I think they should be engaging with me. Industry as far as I'm concerned is getting a very cheap deal.

(Interview, Head of School, I2, 2008)

This quote suggests that communication between industry and academia could be improved. In this connection, industry advisory committees (which contribute to most Construction programs) could play a part in raising the awareness of all concerned to these complex issues.

Some students requested more support from their university in accessing industry. At some universities students noted that they did not have sufficient contact with industry whilst at others there appeared to be ample. Some students felt they needed more information about industry, employment opportunities and support securing employment in industry.

Students also stated that sometimes their industry experience was a hindrance as it was too lengthy, and sometimes not relevant (e.g. photocopying instead of being on site). In this regard, some students expressed concern that part-time employment in the industry was not sanctioned as valid industrial experience (i.e. did not count for the mandatory periods of industrial experience required by the accrediting bodies). This is reflected in the following quotes:

I think part-time work should be counted.

(Interviewee 1)

I think it should be counted too.

(Interviewee 2)

Because you're seeing a project actually evolve over a year or however long it takes, whereas if you do work experience for four weeks then you're probably seeing that bit. So it's much more.

(Interviewee 1)

I think the issue is that the industry has such a shortage at the moment that they need to understand that if we have a job in the industry we're actually doing a lot of work. Like, I'm a part-time employee but I almost carry on a full-time job. Like, even when I'm in a lecture I'll receive calls and have to call people back and stuff. Yeah, the industry is just crying out for people. When you do get a part-time job it becomes quite serious. The work that we are doing part-time is actually meaningful work. I think that they should not just go oh well, we're not going to look at it at all because it's part-time; they should take it on a case-by-case basis.

(Interviewee 2)

(Student Focus Group, F4, 2008)

In this connection, it appears that there is ambiguity as to what constitutes valid industrial experience. Some members of staff indicated that they would be willing to accept part-time work experience as contributing to the requirements of accreditation. However, these quotes suggest that this is not the case for all universities. Accrediting bodies are asked to note this issue, and consider revising their requirements.

Working and studying presents all stakeholders with challenges. Students currently live in a world that is very different from that which members of staff experienced when they were studying. Many students need to work to feed and clothe themselves. To compound the situation, industry was (until the start of 2009) experiencing a skills shortage. These factors combine to require all concerned to explore new ways of combining work and study. Some of the implications for teaching and learning are explored in the next section.

6.4 Impact on teaching and learning

This section outlines the impact of the issues identified above on teaching and learning from a student's perspective. It is clear that many lectures and tutorials are poorly attended. Furthermore there are tensions between what industry wants from graduates and what universities are required to provide to be accredited and to satisfy their own quality assurance processes. There are also issues with assessment and feedback, as well as with group work.

6.4.1 Students' preferred learning style

Students expressed preferences for teaching and learning approaches other than traditional lectures. For example, some students felt that exams did not facilitate a deep understanding of subject matter, as shown in the following quote:

. . . as assessment I prefer coursework which is assignments and those kinds of things rather than exams because I think with exams a lot of students just brainstorm for a week and try and remember everything they can for the exam and then a week after the exam they've forgotten everything they learned.

(Interviewee 1)

(Student Focus Group, C4, 2008)

It is interesting to contrast these views with those of a member of staff. The pitfalls of assessing students using formal examinations are apparent to some staff, and steps are being taken in some institutions to implement different approaches.

I didn't attend [lectures when I was at University], so there [are] many gaps in my knowledge. So I studied the night before and regurgitated the short answer questions, and what's the value? None. So I'm really keen for students to come [to lectures] . . .

(Interviewee)

That's really is interesting.

(Facilitator 1)

Because what it says is we value your attendance, we value your opinion on what you're learning in class. So we're making that change in our culture. And it's a big change, because I think . . . three years ago we were probably very similar, very poor attendance. In our later years we still have quite poor attendance. So we're also going to change the way we relate to employers.

(Interviewee)

(Interview, Head of School, L1, 2008)

In addition to assessment, students saw value in activities other than formal lectures. For example:

I prefer the more tutorial things where it's like a small group of people compared to lectures where the teacher tends to get a bit more across than in a lecture. Especially with subjects like measurement and things like that where the lectures always seem a bit pointless.

(Interviewee 1)

That's interesting . . . so it is actually the dialogue about the subject and you feel like that's how you learn?

(Facilitator)

Yeah I agree. It's probably easier to learn when you're in a smaller group because you've got more access to the teacher or whatever. It's a lot easier to ask them questions or you know like you just go and see them afterwards or whatever.

(Interviewee 2)

(Student Focus Group C4, 2008)

Other students endorsed these views as the following quotations show (The reader's indulgence is requested here. The sequence below is lengthy, but eloquently illustrates several pertinent issues):

I was going to say something about the face-to-face learning . . . We don't really have any other sort of learning at university at the moment. I think maybe when the face-to-

face learning does break down, say you have a poor relationship with the lecturer or he's not communicating to you properly, there is no other back-up sort of thing; I find that there's really no other supporting material I find.

<div align="right">*(Interviewee 1)*</div>

That's what I was actually going to ask you before.   When you said that you can't understand the lecturer sometimes, is there any support for something like that.   So you don't have the lecture notes online?

<div align="right">*(Facilitator)*</div>

Yes, they are, but it's pretty flat and I'm not really engaged.

<div align="right">*(Interviewee 1)*</div>

Do you think there could be other ways?

<div align="right">*(Facilitator)*</div>

If the lecturer was excited about it, or even half-excited.   I mean, sometimes they make you laugh.   But if they're keen, you seem to take more in when they're genuinely interested in what they're doing.   We had this topic last semester that was very dry— regulations—but the lecturer was pretty good at covering a very ordinary subject. Everyone loved it and we all did really well.

<div align="right">*(Interviewee 2)*</div>

He'd even managed to get a full lecture at 9am on a Tuesday

<div align="right">*(Interviewee 1)*</div>

So that was pretty amazing.   If it had have been taken by someone who was a little less keen, or a little less serious about the subject, you would not have seen that lecture theatre full at all.

<div align="right">*(Interviewee 2)*</div>

But there, again, he was an industry professional.   He wasn't an academic.   He had done his PhD, but many years ago.   I think that if we can get more people like him through the universities . . . He's not sick of teaching, because he doesn't teach like five times a day.   He doesn't hate his students when they walk in the door, because he is actually doing it out of fun and I think he really wanted to be there.   That was great. He engaged us with a really dry topic and we all did really well.

<div align="right">*(Interviewee 3)*</div>
<div align="right">*(Student Focus Group F4, 2008)*</div>

These quotes show that students use a wide variety of learning approaches and respond to enthusiastic teachers.   Clearly these learning approaches need to be accommodated and encouraged if students are to realize their potential.   The following discussion on teaching and learning styles shows the need for a curriculum that allows and supports students to engage in activities that are outside traditional modes of learning.

Teaching protocols

Outcome-objectives to be met by teaching include three levels of thinking ability (Cowdroy & Williams, 2005):

- **Lower-level task abilities.** These are typically procedural, and are characterised by following set procedures.   Thinking behaviour is informed by recall/recognition of domain-specific knowledge.
- **Mid-level task abilities**.   These are typically 'analytical/diagnostic' and are characterised by finding explanations/solutions for phenomena/problems within a limited range of set theories.   This level is significantly more demanding and more

domain-specific than in lower-level task abilities, and requires specified outcome-objectives to be met.

- **Higher-level task abilities.** These are typically multiple complex requirements which are multilateral, very demanding and domain-specific.

The three levels of thinking summarised above provide a hierarchy of skill complexity. If students are to achieve all three levels of complexity, appropriate learning strategies must be put in place.

Learning strategies

To attain the various levels of thinking ability defined above, it is important to implement multiple learning strategies (Gibbs, 1995) In general terms, in any course or program that is intended to develop higher-level task abilities, a combination of learning strategies must be engaged. If this is not the case, students will fail to develop the three levels of thinking which are important for professional programs.

Teaching strategies

Traditional teaching strategies accommodate the development of lower-level task abilities as defined above. However they cannot, on their own, accommodate the mid and higher-level thinking abilities required of Construction education. Recently developed teaching strategies (such as cognitive apprenticeships and various forms of problem-based learning) aim to develop 'more relevant' mid-level abilities. Exotic teaching strategies (including integrated learning and research-based methods) (Cowdroy & Williams, 2005) aim to develop a 'professional standard' of higher-level task abilities. These approaches have generally been successful, but they have their limitations, particularly when rigidly applied. For instance, cognitive apprenticeships in their 'pure' form, with emphasis on analytic/diagnostic thinking behaviours, have been very successful in developing mid-level task abilities but restrict individualistic projective/prognostic thinking and therefore have had limited success in developing higher-level task abilities. On the other hand, integrated learning and research-based learning strategies in their 'pure' forms (Cowdroy, Kingsland, & Williams, 2007) have been very successful in developing higher-level task abilities, but have restricted the development of lower-level foundation task ability.

It is evident from the above that students need to engage in diverse learning experiences to develop a full range of abilities. These are time-consuming to attain, and students need to allocate sufficient time to develop relevant knowledge, skills and attitudes. If these processes are rushed, students tend to react pragmatically and remain at a lower level. Trying to accomplish too much learning in a short time inhibits deeper learning and thinking. Students who work long hours and try to study extensively may be at risk of containing their learning to lower levels. It is therefore important to provide varied learning opportunities to ensure that students experience all levels of learning.

6.4.2 Opportunities—new teaching approaches

Several of the staff interviewed mentioned that students expected to be 'entertained' during lectures and tutorials. Engaging students has always been a challenge but the expectations of current cohorts appear to be influenced by their engagement with TV and other contemporary media. Some members of staff felt uncomfortable about the pressures that accompany such expectations.

> *Yes. They are different. I had a number of meetings with the schools. We had a workshop. They also said something that they want very quick feedback, straight away after submitting assignments. They don't want to turn up to class. Even when*

they turn up to class, they are busy playing with their toys, their iPhone or mobile phone or laptop or something like that. Their concentration is very low in the class and they are not attending very well at the moment. It could be that they're working, or it could be to do with the technology. They prefer all their stuff to be online so that they can look at it from home and see whether there is a need to go to classes or not.

(Interview, Head of Programs, K1, 2008)

Whilst some aspects of Construction curricula may be more challenging than others to deliver in an exciting way, some applications are intrinsically visual, high tech and appealing to students. For example, one participant discussed introducing Building Information Modeling (BIM) into a course to make learning more visual. For example:

Well we set an assignment where we give them the BIM model. They have the 2D drawings with the BIM, but it hasn't worked that well. Some students have taken it up and others haven't. But it isn't in the curriculum, it's purely to have them to start using it and to help them visualise 3D models . . . it's also a means to an end, because the technology (will be used) for cost planning and so forth in the future.

(Interviewee)

(Interview, Head of Programs, C2, 2008)

Another approach suggested by some staff was to attract students with higher entry scores. The following quote illustrates staff perceptions in this regard:

We've got a lot more students so that makes a big difference as well. You've got a lot more students; they've got an easier entry into university so you get a lot of pretty average students.

(Interviewee)

(Staff Focus Group C3, 2008)

Furthermore, some participants suggested that communication between staff, students and their employers be improved so that all concerned could understand their respective situations.

Notwithstanding the suggestions contained in this section, there are factors which compound the difficulties staff experience when they endeavour to create innovative curricula to promote higher order learning. Class sizes have increased and curricula have become increasingly fragmented. There are no easy solutions and it is evident that those responsible for renewing Construction curricula for these new student cohorts have a challenging time ahead of them.

6.4.3 Changes in assessment

As discussed, many staff noted that their lectures and tutorials were poorly attended. Some suggested strategies to encourage students to come to classes. One approach was to conduct in-class assessments on a regular basis. It was observed that this ensures students come to class and learn, as illustrated in the following quote:

Our students are very mercenary. If there's no point to come to the lecture they don't come. And that's a technique I used [elsewhere] all the time. . . .to actually get the students to explore what they're doing while they're doing it. So they can understand

whether things make sense or not, and then you can get some feedback yourself as to whether they've understood it or not. So I used to use this three, two, one grading system . . . And I've suggested to my staff that they do the same kind of thing.

(Interviewee)

So what was that?

(Facilitator 1)

Well you do some activities in the class, and you collect them and you grade them. You give them a three if they really got it and did a good job, you give them a two if . . . they've done something, and you give them a zero if they weren't there.

(Interviewee)

(Interview, Head of School, L1, 2008)

The example cited above indicates one way of encouraging students to attend classes. Other approaches to assessment are referred to in the relevant literature below (Balfour, 2007; Brewer, Williams, & Sher, 2007; Campton & Young, 2005; Kajewski, 1996; McLaughlin & Simpson, 2004).

If the primary purpose of assessment is to measure students' abilities in terms of educational outcome-objectives explicitly defined in the curriculum, assessment must be aligned with outcome-objectives. As with teaching methodologies, assessment must be varied to ensure that attainment of the three levels of learning is measured. The following discussion is therefore confined to educational assessment.

The appropriateness of an assessment protocol is determined by the order of task ability to be measured. Assessment of lower-order abilities is most appropriately undertaken using lower-order assessment methods. These methods are already part of conventional good teaching practice, and include examinations (of knowledge), demonstration (of procedural abilities), and various types of exercises, assignments and reports that are geared to multiple choice, short answer and true/false range of assessment types and use single assessors (Cowdroy & Williams, 2005).

Assessing middle-order and higher-order task abilities, however, is more appropriately undertaken using *holistic/hermeneutic* approaches that can simultaneously accommodate multiple and variable criteria associated with various types of knowledge, thinking processes and application skills. For instance, informed assessor panels increasingly holistically assess students' case study projects, addressing middle-order task abilities. Similarly, students' prognostic projects addressing higher-order task abilities are typically assessed holistically and hermeneutically, and by presentations or vivas.

Consistent use of particular hermeneutic assessment strategies allows students to become familiar with criteria and to develop their own self-evaluation or reflection, thereby enhancing their self-direction capabilities. Adopting hermeneutic assessment strategies, when coupled with appropriate teaching strategies, offers opportunities to develop (negotiated) assessment contracts with students, which delegate responsibility to students for all except final assessments. These provide the flow-on benefits of promoting extensive self-directed learning strategies with significant cost-benefit advantages.

No single assessment-type is appropriate to lower, middle and higher-order task abilities. As most higher education programs (and courses within programs) are intended to develop a range of lower, middle and higher-order task abilities, multiple assessment protocols must be adopted and coordinated to achieve effective overall benefits for learning. Strategies need to be implemented to encourage these task abilities within assessment items.

6.4.4 Students learning through working

Construction academics appear to value work integrated learning (WIL) but the manner in which it is administered in these programs leaves considerable room for improvement. This suggests a misalignment of expectations. Students need to be able to transfer the knowledge and skills they have gained at their university to the workplace. Some of the students interviewed suggested that they learned more from their employment in the industry than from the courses they took as part of their degree.

Students gain a lot from working in industry whilst still studying. The following quotes from different students illustrate the learning that occurs in the workplace:

> *You already have an understanding of the principles so you just build on that and you end up doing better.*
>
> *(Interviewee 1)*
>
> *And there are a lot of people at work who are qualified and they're like in the area of expertise we're like studying so if we've got any questions or anything we can ask them. So it's twice the resource of information at work. So for assignments if you ever need to ask a question you ask one of those guys and then use it.*
>
> *(Interviewee 2)*
> *(Student Focus Group, C4, 2008)*

> *Yeah, if we finish this course and we go out, it's worth nothing. Like you haven't learnt anything like you have to relearn everything again. I'm doing an estimating course and what I've learnt at uni and when I go (to site) I'm learning all over again so like I'm basically going out of uni knowing nothing . . . that's relevant to the [world of work].*
>
> *(Interviewee)*
> *(Student Focus Group, K3, 2008)*

These quotes show that students benefit from their work in industry. Hager, Garrick, Melville and Crowley (2001) state that employers in the construction industry see industry-related skills as being predominately acquired through on-site experience rather than formal education. Indeed, some view their work as more valuable learning opportunities than those they experience at university. WIL encompasses strategies that harness such work-based opportunities and exploits them as partnerships between industry and academia. An example of an innovative implementation of WIL was identified during interviews, as below:

> *We're looking at work-integrated learning now. We've figured out that a lot of [students] in our industry work quite a lot. They work a lot more than other undergraduates too. So it's to do with our industry and the money that they get, those sorts of things. We're trying a couple of work-integrated learning ideas to see what might be of value.*
>
> *(Interviewee)*
>
> *So to actually get credit for their work?*
>
> *(Facilitator)*
>
> *Yes. We've got a few different models lined up. There are models whereby students work entirely in industry and they produce something which is assessable. There are models where they bring an industry project back to the university and then work on it as individuals or groups as a university-centred project that is industry-focused. There are models where industry comes to us with ideas and resources and we set things up*

specifically for them, either in their workplace or here. There are a number of different approaches. The one I'm using at the moment is called enterprise education.

(Interviewee)

(Interview, Programs Coordinator, L2, 2008)

Students recognise the opportunities work-centered learning provides. Some see connections between such learning and the apprenticeships that form an intrinsic part of education in trades. For example:

I always thought that they should consider doing it like a half apprenticeship type thing where you do uni is half of what you do but it's all on the job stuff.

(Interviewee 1)

Which is kind of what you're doing?

(Facilitator)

Yeah but not so much of the uni side of things.

(Interviewee 1)

Oh right.

(Facilitator)

Personally I reckon that should be done across all construction subjects because it's almost like a trade in a way the stuff you do. It's not something you can just learn from a textbook.

(Interviewee 1)

(Student Focus Group, C4, 2008)

The discussions above illustrate the opportunities Construction programs provide to students to exploit their work in industry as learning events. They support a need to investigate ways to rigorously integrate WIL into Construction programs.

6.5 Conclusion

This chapter has identified the key characteristics of Construction students including:
- commencing, continuing and completion rates
- overseas enrolments
- Indigenous and female enrolments
- age demographics, and characteristics of Generation Y and 'NetGeners'

In addition, it has identified pressures which Construction programs impose on students, including:
- timing of assessment items
- traditional assessment approaches
- group work
- lack of feedback on assessment items
- large class sizes
- inconvenient timetabling.

Challenges to students from industry were identified as:

- securing industry experience
- working whilst studying
- a desire for shorter degrees
- lack of appreciation for student study commitments

Finally, the impact of these issues on teaching and learning were seen as:

- challenges to staff to recognise preferred learning styles of students
- opportunities for staff to develop teaching protocols, learning and teaching strategies
- opportunities for students to engage in WIL

Some solutions to these challenges are proposed in the next chapter.

7. CONCLUSION AND RECOMMENDATIONS

This study has shown that Construction academics, professional institutions, industry bodies, industry representatives and students all recognise the importance of a strong discipline domain. It was the view of all concerned that respect for and recognition of the disciplines ensures a strong future. All affirmed their high regard for the domain continually throughout the study. However, this does not mean that there are no issues to address. This study identified aspects that need strengthening and refining. These are identified in this chapter, followed by a series of recommendations drawn from the findings of the preceding chapters.

It is important for all stakeholders to engage with and support the changes recommended here. This may prove to be challenging, because Construction disciplines are diverse. The domain is fragmented, with graduates taking on many varied workplace responsibilities and job descriptions. Furthermore, there are more than ten professional institutions that accredit Construction degree programs (including several that have a specific international remit). It is interesting to contrast Construction stakeholder involvement with that of architecture and engineering, where strong communities of supportive stakeholder organisations as well as teaching and learning communities exist (in industry as well as academia) (King, 2008; Ostwald & Williams, 2008). This is not to say that none exist for Construction. They do, but their efforts are arguably overshadowed by other higher-profile professions.

This chapter contains a series of recommendations that address the challenges and opportunities identified in this report. They relate to resourcing, the roles industry can play in supporting the programs, supporting lecturers, teaching issues, research, and sharing and networking. Each recommendation contains a description of the issues involved, a summary of the relevant findings of this project, and finally some proposals to address them. The recommendations align with the goals of the ALTC and target areas for future funding proposals. Each recommendation identifies organisations that could assist. The recommendations will need to be prioritised by stakeholders to identify the urgency and actions required. A leadership team to progress these recommendations is imperative. This chapter therefore sets out a plan for the next decade for the development and improvement of tertiary Construction education in Australia.

7.1 Changes in resourcing

Recommendation 1: Improve funding of Construction education	
Issue	The funding levels for Construction programs as determined by government models are inadequate to accommodate the profile of the disciplines and the students studying in them.
Summary	Construction student places are funded by government at a level that is much lower than that of comparable professions with similar educational needs. This under-funding results in inadequate levels of staffing and resourcing. The funding differentials embedded in government models are outdated and limit the extent to which these disciplines can reach their research and teaching potential.
	Chapter 6 provides some examples of the ways in which students' learning

	experiences have been compromised. Construction disciplines would greatly benefit from funding parity with such disciplines as engineering.
Response	In Australia, academic and professional bodies such as AUBEA, AIB, AIQS and AIBS should liaise with DEEWR to develop a suitable funding model to appropriately support the costs of Construction education. This model should position Construction at a level consistent with other disciplines that: (1) require workshops and high level computing facilities, (2) have a substantial curriculum component of field or laboratory work, and (3) have a research focus.

7.2 Industry's role

Recommendation 2: Rationalise and integrate accreditation requirements	
Issue	Meeting the requirements of the numerous professional institutions that accredit Construction programs is onerous and costly for all concerned. Consider streamlining these processes (possibly by implementing arrangements similar to the Washington accord for engineering degrees).
Summary	When compared to other professional disciplines it is evident that Construction is accredited by an extremely large number of institutions. Accreditation generates a significant workload for staff and invariably operates in parallel with the quality assurance processes required by the Australian government. The impact of the Australian Universities Quality Agency (AUQA) audit has been significant with most universities developing comprehensive quality assurance systems that review practices and engage industry and professional bodies. Consideration should be given to avoiding such duplication of activities.
Response	Accreditation provides a highly valued verification of the educational experience provided by each university. However, it comes at a cost. To address the requirements of the multiple stakeholders involved, professional institutes, industry representatives and universities need to collaborate to streamline the current processes and reduce the workload involved. A coordinated strategy that reaches beyond national boundaries is required. The following actions are proposed: (1) Synchronise the timing of multiple accreditation visits. (2) Streamline the remit of accreditation visits and apply processes and procedures consistently. (3) Align accreditation with existing university quality systems. Full value must be made of existing systems. (4) Lobby for a Washington Accord (Engineers Australia, 1989) equivalent for Construction programs. This would allow coordination to occur at a national and international level and would avoid engaging multiple national bodies that represent the same discipline (e.g. AIQS, RICS, SISV and MBQS). It is important that these initiatives result from a coordinated strategic approach by universities, professional bodies and industry. This topic should be included as part of a national forum and should be progressed by a team specifically identified for its implementation.

7.3 Supporting those who teach

Recommendation 3: Address staff shortages for current and future needs	
Issue	A major concern for Construction disciplines is succession planning of academic staff. The age profile of existing staff shown in Figure 5 indicates that the disciplines are at risk from severe under-staffing in the future.
Summary	Many of the issues facing Construction education may be attributed to current funding levels for these programs (see Recommendation 1). This has been exacerbated by industry offering higher salaries than the tertiary education sector (AIB, 2008a). The construction industry is more exposed to the economic climate than many other professions. At the time of writing, the global financial crisis has resulted in a decline in construction activity, and employment prospects are likely to be affected. It is possible that industry practitioners may be attracted to teaching, but they will need to meet the research and higher degree requirements of universities. Measures need to be taken to ensure that suitably qualified candidates apply for Construction teaching posts. The Bradley review (Bradley, Noonan, Nugent, & Scales, 2008) argues that: "Greater incentives and more support for high performing international students to undertake research degrees in Australia and more places and better support for domestic research degree students will assist us to deal with a looming shortage of academics and researchers. This is necessary to ensure we have enough well-qualified staff to manage the proposed increases in participation and to maintain the stock of researchers in the innovation system." (Bradley et al., 2008:xvi Recommendations). This recommendation is strongly endorsed.
Response	Addressing staff shortages is a complex issue and requires multi-pronged responses. To ensure academic and industry credibility both the university sector and the construction industry need to work collaboratively. Consideration should be given to initiatives such as: (1) encouraging Construction graduates to enter academia. Steps need to be taken to attract graduates to consider academia as a career path; (2) developing a collaborative approach to provide industry experience to academics that does not compromise their academic career. A short-term industry 'sabbatical' could be developed to meet both industry and university needs. In this regard the UK Industrial Fellowship Scheme (Foundation, 2008) provides a useful model for an 'industrial secondment'; (3) developing systematic recruitment strategies to attract more academics with appropriate industry experience; (4) acknowledging academic staff who meet teaching-related milestones (e.g. improving curricula, renewing their industry experience); (5) publicising Construction programs (e.g. the importance of industry experience, the need for research in Construction). Use could be made of media and forums to gain public recognition of these issues to lobby for Government funding. Encouraging industry-based research, and industry practitioners to complete research higher degrees could enhance this. Sponsorship of staff would provide a catalyst to promote fruitful relationships between universities and industry; and

	(6) advertising for industry professionals to teach in the disciplines.

Recommendation 4: Adopt strategic approaches to improve promotion rates

Issue	An evaluation of the promotion rates of Construction academics showed that these were significantly lower than other disciplines (such as architecture and engineering).
Summary	Academics in Construction are promoted at a significantly lower rate than their colleagues in architecture and engineering. (However, Construction graduates often attract higher salaries that either architects or engineers. Construction academics are able to earn more in industry than at university. It is clear that financial rewards do not attract staff to Construction teaching).
	Promotion criteria generally require staff to meeting teaching and research targets, as well as administrative and community requirements. Construction academics with current industry knowledge rarely possess research higher degrees and need to combine their teaching and other responsibilities with their higher degree studies if they are to be promoted. In many cases, these academics find that the workload involved inhibits their prospects of promotion.
Response	(1) Attract high quality academic staff. This needs to be underpinned by attracting high-achieving students. This could be achieved by promoting Construction degrees and by emphasising the contributions of Construction professionals to society, as well as their career and lifestyle opportunities. A strategy that has been used successfully in the UK is to publicise case studies and the career pathways of Construction professionals (BConstructive, 2008; Bebo, 2008)
	(2) Encourage universities to support and encourage these high-achievers (possibly with scholarships or similar financial inducements).
	(3) Develop partnerships between industry and universities to promote research projects and thereby improve the research profile of the disciplines. These should enhance the promotion rates of staff. Exploit opportunities presented by Australian Research Council (ARC) Linkage funding.
	(4) Disseminate this ALTC report to university upper-level management.
	(5) Engage the media at a high level to improve their reporting of matters related to Construction disciplines. Include case studies about the variety of occupations available.

Recommendation 5: Overcome fragmentation of curricula

Issue	Construction curricula are highly multi-disciplinary in nature, and have a tendency to become fragmented. This tendency is exacerbated by program and course rationalisation resulting from constrained budgets.
Summary	Construction curricula cover a diverse range of content (refer to section 2.2.1). This variety is valid considering the complexity of the roles graduates work in, as they need to cope with technical, human, financial and legal challenges in their day-to-day jobs. Developing and maintaining an

	appropriate balance between these areas is not an easy task. New content areas are continually being proposed, for example, to meet university requirements (core skills) and industry requirements (IT applications and new legislation). Without careful management it is possible for curricula to become fragmented and for individual components to lose their relationship to each other. It is important that curricula retain coherence. Should elements of course content lose their relationship to each other, entire curricula may be compromised, resulting in knowledge components becoming isolated.
	Furthermore, the practice of merging students from different degree programs into common courses adds to the potential for content to become isolated. Inevitably, a lack of context results in discipline-specific perspectives being lost. While merging of student cohorts can add valuable multidisciplinary and trans-disciplinary opportunities, it can also lead to a loss of focus. It is important to ensure that curricula are cohesive and provide articulated and integrated learning experiences.
Response	Because there are advantages in multi-disciplinary program structures, there is no single solution to this issue. The more multi-disciplinary a program, the more likely it is to need additional resources dedicated to the development of core skills and industry-specific content. To ensure that this does not become a problem, academic leaders must be aware of these issues. Implicit within a program of learning should be mechanisms to facilitate students' understanding of the components of the curriculum and their relationship to each other. Support materials should be developed to help academics deliver integrated learning experiences. Materials or workshops need to be developed and provided to practitioners. This activity falls most appropriately with the ALTC as a provider of support for teaching and learning.

Recommendation 6: Avoid overcrowding of curricula	
Issue	The minimum curriculum requirements identified by the accrediting professions are becoming more extensive than can reasonably be covered in the time available and with the diminishing resources available.
Summary	In recent times, there has been a gradual reduction in semester length, and an associated reduction of contact hours in Construction programmes. Most universities have also placed increased emphasis on generic skills development and research skills and abilities. In addition, the resources available for teaching have reduced. There has also been an expansion of curriculum content during this period. The inclusion of a wide range of IT applications and the adoption of new content to meet multiple accreditation requirements are factors that have added to Construction curricula. The result of these trends is that most Construction schools have barely enough time and resources to cover the minimum requirements of professional accreditation. Accrediting bodies need to provide clear guidance with regard to the skills and competencies they require. Furthermore, these requirements need to be revised regularly.
Response	(1) Increase the delivery of inter-disciplinary subjects, particularly with Construction-related disciplines.

	(2) Those responsible for developing curricula should be aware of the challenges of delivering courses to multiple cohorts of students. Courses may evolve and become less specific, so course/program changes need to be effected with care and in accordance with accreditation requirements.
	(3) Guidance on the practical limits of rationalisation needs to be prepared for the Construction disciplines and university managers.
	(4) The extent of industry satisfaction with Construction curricula needs to be elicited.

7.5 How we teach

Recommendation 7: Address teaching and learning issues	
Issue	Construction education is multi-dimensional and these dimensions need to be effectively integrated. Being able to manage construction operations requires graduates who are effective and efficient managers, and are cognisant of and conversant with technical, legal, financial and human issues. This requires teaching and learning strategies that expose students to diverse content areas and allow for their integration.
Summary	Construction academics need to deliver high quality education using current and effective strategies. These need to be researched, adapted and / or developed to identify ways to retain a discipline-specific focus while maintaining cross-disciplinary interests. Changes to curricula are required and these need to be based on sound pedagogy and be adaptable to new technologies and inter-disciplinary areas.
	Whilst the professional institutions that accredit Construction programs support diversity, these programs need to produce graduates with a coherent and recognisable profile. University upper-level management needs to recognise that these programs are vocational, and accommodate the resulting challenges.
Response	A variety of approaches are applicable here. One that warrants further investigation is that of simulated learning tools that help teachers provide students with valid learning experiences. These resources could be provided through the online resource portal outlined in Recommendation 14.

Recommendation 8: Exploit opportunities for Work Integrated Learning (WIL)	
Issue	Students preparing to enter the Construction industry require a sound knowledge of the workplace. One way of equipping them is to have them engage in real-life work activities. Recognising this, Construction students are required to complete periods of industrial experience (generally in accordance with the requirements of AIB and AIQS).
Summary	The extent to which academics facilitate, monitor and evaluate the industrial experience activities of their students is inconsistent across the sector. The benefits of such Work Integrated Learning (WIL) experiences are well documented. However, whether such experience is voluntary, part of the requirements of a program, or simply employment for large numbers of

	students, the educational benefits are poorly articulated and recognised in Construction programs. Equally, the expectations of students from industry, industry groups and accreditors need to be more clearly defined. The drawback is that there is often little to connect the world of work and university learning. Industrial experience provides a vital opportunity for meta-cognitive learning or the linking of work to learning.
Response	WIL should be embedded into Construction curricula in a more structured manner than is currently the case. The Construction professional institutions are encouraged to review their requirements, and enter into a dialogue with universities to discuss ways of more fully exploiting opportunities for WIL. Furthermore, there is potential to develop an online WIL journaling system to map students' university learning against their workplace experiences. Such a system would use current online learning strategies, and align with university programs.

Recommendation 9: Expand and enhance assessment of teamwork	
Issue	The Construction industry relies heavily on team members integrating information from multiple sources, and planning and managing the implementation of their activities. As such, teamwork is a significant core skill for Construction graduates and teamwork activities should be formatively and summatively assessed.
Summary	The findings of this study suggest that the assessment of group activities is problematic. Many Construction courses require students to engage in collaborative teamwork exercises. However, assessment of teamworking skills and abilities creates challenges for staff as well as students. One reason for this may be that universities, employer groups and students require individual grades for team members, and Construction academics typically have limited experience of assessing teamwork in this way. The advent of on-line teamwork is likely to add a further dimension to these challenges in the not-too-distant future.
Response	Construction providers are encouraged to assess the amount of teamwork their students are required to complete. This could become a sponsored activity of AUBEA with information being exchanged between programs to assist in benchmarking. For the individual assessment of team members, 'best practice' examples need to be gathered and adapted, and thereafter disseminated through the Construction portal proposed in Recommendation 14.

7.6 Research as a way forward

Recommendation 10: Establish a forum for educational research	
Issue	There is no appropriate forum within Australia for the development and dissemination of research into Construction education.
Summary	Construction academics engaged in educational research should be encouraged to publish their findings in refereed educational journals. At the

	moment, no Australian refereed journal addresses this need (except, arguably, the Australasian Journal of Engineering Education (AAEE, 1991-Present)). The audience for this research includes: Construction academics; industry practitioners; and members of the professional institutions who take part in accreditation visits and assist in determining educational policy. The annual AUBEA conference provides a forum for the discussion and dissemination of the research outcomes but there is a need for a full refereed journal to support the higher level of scholarship required by DEEWR.
Response	A biennial journal, supported by the disciplines' primary academic bodies or a group of institutions, should be supported and developed.

Recommendation 11: Balance students' work and study

Issue	This study has highlighted the extent to which students work whilst studying. Many take on part-time work and full-time study (or visa versa) whilst some take on full-time (or almost full-time) study and work.
Summary	Many Construction students work long hours whilst studying full time. This raises two questions. Firstly, what impact does paid work have on students' learning? Is their deep learning and linking of diverse knowledge components compromised? Secondly, if the benefits of WIL are recognised, should the duration of Construction programs be reduced? Industry needs to decide if it will accept lower levels of knowledge from Construction graduates. Currently a number of initiatives exist to address accelerated learning (e.g. students in one TAFE institution are able to graduate with two Bachelor degrees in four years).
Response	A comprehensive study of the implications of students' workloads needs to be conducted. Industry needs to take a major role in this study as well as the universities offering Construction programs.

Recommendation 12: Establish a teaching-research nexus

Issue	Many Construction disciplines are restructuring their curricula to align staff research abilities and interests to appropriate study areas. This report endorses this and proposes that staff should integrate their research and teaching activities. This will enhance teaching quality, augment research outcomes, and thereby enhance the status of Construction disciplines. As a consequence, the prospects for the promotion of staff should be improved.
Summary	The Construction disciplines have a unique opportunity to develop a strong nexus between teaching and learning. This stems from their multi-disciplinarity and the wealth of research opportunities which could inform curricula. These disciplines exist in a dynamic environment where industry is continually seeking to enhance its practices and processes. This strategy will allow staff to develop productive research activities and expose students to high level, authentic activities. Achieving an improved teaching-research nexus has the potential to drive the restructuring of many Construction programs, providing them with

	opportunities to adopt research-led teaching practices.
Response	Although the potential to develop such a teaching-research nexus exists, considerable progress still needs to be made. One avenue is for AUBEA to promote networks of academics, and/or clusters of interest groups based on their research or curriculum interests.
	Alignment of research and teaching is widely accepted as a positive development, but there is currently little evidence of this occurring in Construction disciplines. Despite this, it is an appropriate strategy and one that warrants serious consideration. This issue requires rigorous examination and should be facilitated by AUBEA.

7.7 Sharing and networking

Recommendation 13: Improve communication between industry and academia	
Issue	A significant number of issues raised in this report relate to industry's contribution to university teaching. Clear communication channels between industry and academia are needed to capitalise on these opportunities.
Summary	The potential benefits of engaging industry practitioners as sessional academics have been identified in Section 5.3.1. However, their involvement should not be confined to delivering isolated courses or sections of courses. Their input would be valuable in developing and renewing curricula.
	The accrediting institutions require Construction programs to be supported by industry advisory committees (a practice generally endorsed by university QA processes). However, it is not clear how effective these committees are, as this aspect was not investigated in this study. It appears that there is scope for communication to be improved, and for industry to be meaningfully engaged with curriculum design and delivery.
Response	(1) Engage industry practitioners in identifying, setting and reviewing graduate requirements and outcomes.
	(2) Increase the number of joint university – industry appointments.
	(3) Increase the amount of industry-sponsored programs and short courses.
	(4) Improve academic staff experience of current industry practice.
	(5) Increase involvement of industry practitioners in teaching.
	(6) Increase industry-supported scholarships for undergraduates and postgraduates.
	(7) Investigate the research topics and activities industry is interested in.
	(8) Exploit opportunities for experienced practitioners to mentor students and graduates. IT applications (e.g. RAPID (Goodman, 2009) and NURAPID (Clare, 2009)) provide opportunities for such interactions to occur through the Internet. Furthermore, where these activities are staffed by (possibly retired volunteer) professionals, not only will students benefit but the profile and acceptance of the accrediting institutions will be enhanced.
	(9) Increase financial support and input from industry for academia.
	(10) Set up and promote a website for industry and academia similar to the 'ALTC exchange'.

Recommendation 14: Establish a portal for Construction education resources	
Issue	Construction schools tend to operate in isolation and rarely exchange information about their teaching and learning practices with other institutions.
Summary	Australian Construction disciplines are generally isolated from each other and lack awareness of developments in teaching and learning. Many academics are not familiar with the teaching, learning and assessment practices of other universities. In addition, many view their problems and practices as unique and few appear to be aware of national and international advances in teaching and learning.
Response	Several professional disciplines operate websites that act as clearinghouses for exemplars of educational practice. One of the strengths of such websites is that they do not propose a single solution to a particular issue; they provide a diverse range of responses for others to assess and adapt. Such a site is urgently needed for Construction disciplines. The ALTC website provides a vehicle through which AUBEA, as Construction academics' professional body, could facilitate this. Education resources could be made readily available for use by academics. This would also provide a basis for ongoing networking and the development of interest groups which would, in turn, enhance the potential for the expansion of the teaching-research nexus referred to in Recommendation 12.

8. DISSEMINATION APPROACH

8.1 Future dissemination

The recommendations of this Discipline Based Initiative (DBI) for the Construction disciplines will help to significantly improve teaching and learning in these domains. This will primarily be achieved through the dissemination of this report. In addition, this year's annual Construction conference, the Australasian Universities Building Education Association (AUBEA) conference will provide a forum at which the recommendations of this report can be discussed and debated. A workshop has been organised to promote the findings and recommendations of this report. The aim is to inform academic staff about the project findings and to promote debate about the recommendations made. AUBEA presents an ideal opportunity in this regard—a significant number of Construction staff attend the event, including heads of relevant disciplines.

The report will also be made available to the Construction education community in electronic form via the ALTC website (See http://www.altc.edu.au/). This website will be the prime location for downloads, and links to this location will be emailed to all universities on publication.

Additional dissemination to industry and other interested stakeholders will be through the Construction professional institutions. Many of these institutes publish their own newsletters and have expressed their willingness to alert their readers to this report and its recommendations. The authors will write introductory articles summarising the report, as well as details for where the electronic version of the report may be downloaded. Interested overseas institutions (e.g. CIOB and RICS) will also be invited to inform their membership of the report.

In addition, plans are in an advanced state for the publication of a book based on the outcomes of this project. This will be modelled on the ALTC discipline based initiative investigation of architectural education in Australia (Ostwald & Williams, 2008).

These activities will inform a large, diverse and widely distributed audience of the findings of this study. This distribution will promote an awareness of the issues Construction education faces and will stimulate discussion of the recommendations.

8.2 Ongoing dissemination

Dissemination has been ongoing throughout the duration of the project. Construction academics have received newsletters at various stages of the project, informing them of progress. In addition, the annual AUBEA conference was targeted in 2008 to reinforce earlier communications and to present a forum for the exchange of ideas with stakeholders. A keynote presentation was made at this conference.

8.3 Links with other disciplines and projects

The project team identified common areas of interest with other disciplines, namely architecture, engineering and nursing.

- The ALTC discipline based initiative investigation of **architectural education** in Australia (Ostwald & Williams, 2008) was found to have provided similar recommendations, especially in relation to increased staff teaching and research

workload pressures. This project was also conducted in the School of Architecture and Built Environment at The University of Newcastle.

- Dissemination of progress on this project at the 2008 Australasian Association of Engineering Education (AAEE) conference led to discussions on the findings of the DBI study into **engineering education** in Australia (see King, 2008). The outcomes of the Construction project were found to intersect with those in the engineering report, in particular in relation to curriculum structuring, discipline awareness, resourcing and student industry experience.

- The team identified significant alignment between nursing and Construction. Nursing is also professional in nature and requires students to complete periods of practical experience. Further linkages between these two disciplines were explored and resulted in a recently approved ALTC Priority Project entitled "Facilitating WIL through skills-enabled e-portfolios in the disciplines of engineering and nursing".

Links with other ALTC studies have also been made. Project staff have participated in activities on the "Design Based Curriculum Reform within Engineering Education" led by Dr. Carl Reidsema at the University of NSW. In addition, potential exists to liaise with the "Professional Education in Built Environment and Design" project led by Ms. Susan Savage at QUT (though contact with this project has been minimal to date). These two projects address issues which are similar to those in this Construction report, in particular, education in the built environment and curriculum changes in engineering education.

9. ACKNOWLEDGEMENTS

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ABREVIATIONS

AIB	Australian Institute of Building
AIBS	Australian Institute of Building Surveyors
AIQS	Australian Institute of Quantity Surveyors
ALTC	Australian Leaning and Teaching Council
APC	Assessment of Professional Competence
AQF	Australian Quality Framework
ARC	Australian Research Council
AUBEA	Australasian Universities Building Education Association
AUQA	Australian Universities Quality Agency
BCA	Building Code of Australia
BIM	Building information modeling
Bond	Bond University
CIOB	Chartered Institute of Building
Construction	Construction management, quantity surveying and building surveying
CPD	Continuing professional development
CQU	Central Queensland University
CQU BD	Central Queensland University, Building Design
CQU BS	Central Queensland University, Building Surveying
Curtin	Curtin University of Technology
DBI	Discipline based initiative (projects of ALTC)
Deakin	Deakin University
DEEWR	Department of Education, Employment and Workplace Relations
EFTSL	Equivalent full time student load
IT	Information Technology
LMS	Learning Management System
Melbourne	The University of Melbourne
NAWIC	National Association of Women in Construction
NetGeners	Internet Generations (of people)
Newcastle	The University of Newcastle
QUT	Queensland University of Technology
QUT QS	Queensland University of Technology, Quantity Surveying
RICS	Royal Institute of Chartered Surveyors
RMIT	RMIT University
SISV	Singapore Institute of Surveyors and Valuers
UNISA	University of South Australia
UNSW	The University of New South Wales
UTS	University of Technology, Sydney
UWS	University of Western Sydney
WIL	Work Integrated Learning

APPENDIX 1

Pro-formas for facilitated discussions

Focus group schedule - academic staff

- Welcome
- Ethics
- Overview of Topic
- Provide overview of plan for discussion
- (Check that everything has been understood, information statements have been read and consent forms signed).
- (Introductions)

BEGIN RECORDING

Teaching and Learning

1. What do you feel are the biggest issues in regards to teaching and learning facing *Construction* education today? Prompts: Values, attitudes, resources, economics, culture, bias, cost, role of others, workload, information technology, class sizes, course structure, academia versus industry, teaching versus research, the curriculum and course structure.
2. Do you think there would be a consensus in the School on these biggest issues?

Students

1. A significant number of respondents identified that students' working whilst study was an issue. Does students' working whilst studying present itself as a problem at your School? If so in what ways? How do you see ways that this problem could be managed?
2. Attributes of Generation Y was identified as an issue in the survey. Do you think this is a problem in regards to teaching and learning? Are you doing anything to address this? Or what do you think could address this?

Assessment

1. What is your predominant mode of assessment and feedback? Are there any primary issues confronting assessment and giving feedback?
2. Are there changes you would like to see in the curriculum/discipline in regards to assessment?
3. Do you or would you like to experiment with other ways of assessment and or feedback?

Distance Team Work

1. Do you believe in the practice of distance learning?
2. Do you think the practice of distance teamwork is growing in prevalence in the *Construction* industry?
3. Do you think there is a need for more education of skills for effective distance teamwork in the disciplines? If so, in what ways?

Curriculum

1. Do you find that there is an issue with the disciplines in regards to it being like a network of interrelated subjects, with some subjects being run within other departments? What processes were used in the development of your curriculum? Like was it a collaborative process, or based on accreditation rules?

2. The survey showed that *Construction* Education is not recognised compared to other disciplines, such as Engineering. For what reasons do you think *Construction* Education is undervalued or not seen as 'academic'? Do you think this is an issue?

3. Does student's industry experience present itself as an issue in your School? What could help it? How could it be better managed/supported?

Role of Accreditation

1. The survey identified Accreditation as having issues. What is your Schools experience of Accreditation. If a problem, in what ways do you think this process could be improved? Prompts: Does it stimulate your practice? In what ways does it value add?

Industry

1. The survey identified a perceived conflict between industry expectations and University education. Do you think this is a problem? If so, in what ways do you think this conflict could be resolved?

2. Does industry expectations cause problems with your teaching? What like?

Staff Issues

1. Do you think staff working in industry is important and or an issue for teaching if have not?

Staff Workload

1. A significant number of staff identified workload as an issue in the survey. Do you see this as an issue at your School? What do you think contributes to your workload?

2. Does the problem of too much administration requirements influence your workload?

3. More than half of the survey respondents either stated that they had 'no' or one promotion over their teaching career. Do you feel that this is a trend at your School? Are there reasons you think why this is happening? Prompts: Promotion under-valued, values or expectations of staff, politics in the workplace, academic expectations.

4. Are there any other workload issues that are limiting or inhibiting you in achieving your teaching outcomes?

5. Are there tensions between work balances of research and teaching? If so how does it present itself? How do you see that this tension could be improved?

Research

1. Connected to your workload, is their pressure within this organisational unit to do research? How is it measured?

2. Do you see there is a need for more research like this study on the disciplines?

3. How important is other research in Construction in this School? Prompts: Past, present, future, publications, teaching and research.

4. What sort of research is being undertaken? Prompt: Is it creative, social, scientific (traditional) based research?

Future Change

1. What are the main resources that you need for delivering these disciplines at your School/What would be the most beneficial to you?

2. What do you see are the major changes needed in the disciplines/curriculum to improve Teaching and Learning? What systems/initiatives do you think are needed to support these changes?

Questions

1. Is there anything else you would like to add?

2. Do you have any questions for the researcher?

Semi-structured interview guide for heads of school and course convenors

Introduction
Ethics
Background to Project

BEGIN RECORDING

Teaching and Learning

1. What do you feel are the biggest issues in regards to teaching and learning facing *Construction* education today? Prompts: Values, attitudes, resources, economics, culture, bias, cost, role of others, workload, information technology, class sizes, course structure, academia versus industry, teaching versus research, the curriculum and course structure.
2. Do you think there would be a consensus in the School on these biggest issues?
3. How has your academic role in regards to teaching and learning changed over time?

Curriculum

1. The survey showed that Construction Education is not as highly valued or recognized compared to other disciplines, such as Engineering. For what reasons do you think *Construction* Education is undervalued or not seen as 'academic' or proper disciplines?
2. The survey identified fragmentation of the curriculum as an issue. What processes were used in the development of your curriculum? Like was it a collaborative process, based on accreditation rules?
3. Some courses/subjects in the disciplines were identified as having the potential to be TAFE courses/subjects. What differentiates your degree program from TAFE studies?
4. Industry experience was identified as an issue in the survey. Does this present itself as an issue in your School? What could help it? How could it be better managed/supported?

Research

1. How active is your School in *Construction* disciplinary education research? Do you see there is a need for more research like this study on the disciplines?
2. How important is generic research in *Construction* education in this School? Prompts: Past, present, future, publications, teaching and research.
3. What is the pressure within this organisational unit to do research? How is it measured?
4. What sort of research is being undertaken? Prompt: Is it creative, social, scientific (traditional) based research?
5. How is the research supported/funded in your School?
6. Are there tensions between work balances of research and teaching? If so how does it present itself? How can this tension be improved?

Industry

1. The survey identified a perceived conflict between industry and University education. Do you think this conflict is present here? If so, in what ways do you think this conflict can be resolved?

Role of Accreditation

1. The survey identified Accreditation as having issues. What is your Schools experience of Accreditation. If a problem, in what ways could the process be improved? Prompts: Does it stimulate your practice? In what ways does it value add?

Staff Issues

1. Finding qualified, industry experienced staff was identified in the survey as an issue confronting the disciplines. Does this present itself as a problem in your School? Why do you think this problem exists?
2. How responsive are staff in revising their curriculum/creating a dynamic curriculum?

3. More than half the respondents said that it has been more than 5 years since they have worked in industry. What are your views on this, is this an issue for teaching?

4. Staff have expressed in the survey that the following aspects of industry – inflexible, staff lacking industry experience, commercialised, gender imbalances, lack of industry perspective in the curriculum, traditional mindsets – cause barriers for making changes in the curriculum. Do you experience this as an issue at your School?

Staff Workload

1. A significant number of staff identified workload as an issue in the survey. Do you see this as an issue at your School? What do you think contributes to the perceived work overload of staff?

2. Does the problem of too much administration requirements inducing staff's workload present itself as an issue here?

3. More than half of the survey respondents either stated that they had 'no' or one promotion over their teaching career. Do you feel that this is a trend at your School? Are there reasons you think why this is happening? Prompts: Promotion under-valued, values or expectations of staff, politics in the workplace.

4. Are there any other issues that are limiting or inhibiting you in achieving your outcomes for the disciplines' outcomes?

Students

1. A significant number of respondents identified that students' working whilst study was an issue. Does this present itself as a problem at your School? How do you see ways that this problem could be managed? ('dumbing down', intensive blocks of study).

2. A lack of understanding as the QS and BS disciplines as being noticed as a career path was identified as an issue in the survey. Do you see this an issue? If so do you have any plans for addressing this?

3. Attributes of Generation Y was identified as an issue in the survey. Are you doing anything to address this? Or what do you think would address this?

Leadership

1. Do you have any issues with your role as Head of School/ Convenor of subjects in relation to the administration of these disciplines at your School? (prompts: power imbalances, communication issues, subject issues)

2. How important is the academic leader/subject convenor to the success of the School/unit?

3. It was noted from the survey that upper management need more awareness of these disciplines. What are your views upon this issue?

Future Change

1. What do you see are the major changes needed in the disciplines/curriculum to improve Teaching and Learning?

2. What systems/initiatives are out there that you think should be utilised to support these changes?

Questions

1. Is there anything else you would like to add?

2. Do you have any questions for the researcher?

Focus group guide for students

Introduction
Ethics
Overview of Research

Student Profile – About you

1. What are you studying and what attracted you to the disciplines *Construction*? Prompt: For professional recognition, qualification, lifestyle, education, advertisement, relatives?

Teaching and Learning

Student Motivation
1. What are the most affective ways in which you learn? Prompts: Lectures, projects, group work, solitary study.
2. What motivates you to do well in each course you do? Prompts: Is it the way the subject is organised, assessment items?
3. Do you prefer face to face or other ways of learning?
4. Are there factors outside of your study that motivate you to become more active in University life?

Study Workload and Working

1. What factors do you feel contribute to a heavy studying workload?
2. Do you find that you have conflict between the requirements of your work (if working part time) and the requirements of University? If so, how does this issue present itself to you?
3. How many hours do you spend on outside work?
4. Do you see that your outside work is impacting on your study? If so, in what ways?
5. Is there anything else that is stopping you from getting ahead with your studies and learning? Prompt: resources?
6. Do you find that missing classes impact on your learning?

Industry experience

1. Do you see the relevance of industry experience for your program?
2. How is your industry experience managed in your program? Is it assessed, not assessed, do you organise it, does the School, or something different?

The Curriculum

1. Do you think the length of your course is a good amount of time for what you are learning? Too long/short (relates to staff opinions on quick fixes and outcome-driven)
2. Do you see the relationship of your courses to your degree program, how they fit together for you? Do you think there is an appropriate balance of subjects in the curriculum?
3. Do you feel that you have been taught the necessary skills to communicate effectively in the online environment?
4. To what extent do you feel your course is teaching online teamwork skills?
5. What technologies are provided by your University to support online teamwork?
6. Do you believe the education of online teamwork skills is important, in preparation for work in the industry?

Assessment

1. What are your views on assessment? Are there issues in the way you are assessed?
2. Which form of feedback do you value the most? Prompt: grades, written, verbal, rubric (telling you how grades are created, self learning portfolio)? What makes this so effective for you?
3. What are your experiences of group work in regards to assessment?

Staff profile

1. What do you perceive are the primary pressures on academics? Prompts: Pressures, workload, qualifications, administration work?
2. Is there enough opportunity for student/staff interaction?

Resources

1. Do you feel your discipline utilises and balances extra curricula resources well? For example, lectures, site visits, guest speakers.

Future Change

1. What do you feel are the biggest issues for you as Construction Students? In regards to the course and/or discipline?
2. In what ways do you think the program could change in the future to help with these issues?
Thank-you for your time

APPENDIX 2

Information statements

Information statements were prepared for staff interviews and student focus groups. The document below is representative of these.

The Research Team:

A/Prof.Tony Williams	Willy Sher	Dr. Catharine Simmons	Brendan Pitt
Chief Investigator	Project Leader	Project Manager	Student Researcher
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Information Statement for the Research Project: Identification of Teaching and Instructional Issues and Opportunities for Construction Management, Quantity Surveying and Building Surveying (CMQSBS) disciplines.

You are invited to take part in the research project identified above which is being conducted by a team led by Anthony Williams from The University of Newcastle. The research team is conducting the project as part of a Carrick Institute grant. You have been selected and invited to participate in Phase Two of the project as you are employed as a Head of School or Discipline Convenor in a School of CMQSBS education as indicated on your University's website.

Why is the research being conducted?

The purpose of the project is to discover what issues confront CMQSBS education. These issues are important as they will influence future directions for education in CMQSBS Schools. There is also the potential for support through the Carrick Institute to strategically address these issues.

Who can participate in the research?

We are seeking all Heads of School, Discipline Convenors or equivalent, employed in schools of CMQSBS education, responsible for educating CMQSBS undergraduates in Australia.

What choice do you have?

Your participation in this research is entirely voluntary. Only if you give your informed consent will you be included. Whether or not you decide to participate, your decision will not disadvantage you in any way. If you decide to participate, you may withdraw at any time without giving a reason. Further, you may also withdraw your data at anytime.

What will you be asked to do?

You will be interviewed and asked questions about CMQSBS education. The interview will take place at a time and location that is convenient to you. One member of the research team will conduct the interview. The interview will be audio recorded and you will be able to review the recording and the resulting transcripts to edit or erase your contribution.

How much time will it take?

The interview will last for approximately forty-five minutes.

What are the risks and benefits of participating?

You will not be asked to discuss specific traumatic experiences. However in the event that this occurs, the researcher will direct you to sources of assistance. You will be able to talk openly and freely about an issue which affects your everyday teaching life. The insights you provide will not only shed light on the society in which we live but may also lead to further research.

How will your privacy be protected?

As a participant you are assured that your privacy, confidentiality and anonymity will be maintained. Your participation and the information you provide will remain confidential and pseudonyms will be used so that you will not be identifiable. Only the research team will have access to the data which will be stored in a locked cabinet in the School of Architecture and Built Environment, University of Newcastle, and destroyed after being kept for five years. In the unlikely event that you give specific details of any criminal behaviour, the researcher will be obliged to report this information to the police.

How will the information collected be used?

The data you provide will be presented in the form of a written report on the Carrick website, journal articles and conference proceedings. Furthermore, some data collected from your in-depth interview will be used towards Mr. Pitt's Masters thesis. Although direct quotations may be used, you will not be identified in any reports arising from the project. You will be sent a summary of the findings after the research has been completed. The Carrick Institute owns the intellectual property of this research.

What do you need to do to participate?

Please be sure you understand this document before you consent to participate. If there is anything you do not understand, or you have questions please contact the researchers.

If you would like to participate, please complete the attached consent form and return it to the researchers via the emails listed above. We will then contact you to arrange a time convenient to you for the interview.

Further Information

If you would like further information about the project please contact Tony Williams

 Tony.Williams@newcastle.edu.au or Catharine Simmons1 Catharine.Simmons@newcastle.edu.au.

Thank you for considering this invitation.

_____
Associate Professor Anthony Williams
Head of the School of Architecture and the Built Environment
per Catharine Simmons
Research Assistant
School of Architecture and Built Environment
University of Newcastle

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[1] **Complaints about this research**

This project has been approved by the University's Human Research Ethics Committee, Approval No. H-2008-0042.

Should you have concerns bout 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.

APPENDIX 3

Online survey sent to academic Construction educators

Thank you for taking time to respond to this survey. You've been selected because you are a full-time or near to full-time academic teaching construction related subjects at a University. Our research is funded by the Carrick Institute and will identify the current state of education and the major issues facing Construction Management, Quantity Surveying and Building Surveying (*Construction*) in Australia.

Taking part in this survey is your opportunity to voice your opinions about your teaching experiences.

The findings of our study will be used to identify the opportunities and challenges facing *Construction* education.

We greatly appreciate your involvement in this survey.

Further details can be obtained from the Information Statement

Please Note:

The survey should take approximately 25 minutes to complete

Please take your time and answer the questions as thoroughly as possible

If you cannot complete the survey in one sitting you may save your answers and return at a later time

Some questions are compulsory. You won't be able to move to the next section until all questions in the current section have been answered

If you have no knowledge or experience of a topic, select N/A (not applicable)

Some responses will automatically 'jump' you to the next section without the need to 'Save Answers'

If you have any questions about the content of the survey, please email Dr Catharine Simmons, or phone Catharine on (02) 4921 5779

If you have any technical problems, please email the Survey Administrator

About You
AY1... What is your gender?
(1) Male
(2) Female

AY2... What is your age?
(1) Under 30 years
(2) 30 - 35 years
(3) 36 - 45 years
(4) 46 - 55 years
(5) Over 55 years

AY3... What is your current academic position?
(1) Assistant/Associate Lecturer
(2) Lecturer
(3) Senior Lecturer
(4) Associate Professor

(5) Professor
(6) Other *(please specify below)*
....

AY4... What is the highest degree you have obtained?
(1) Diploma
(2) Bachelor (Pass or Honours)
(3) Postgraduate Diploma/Certificate
(4) Masters (by coursework)
(5) Masters (by research)
(6) Doctorate
(7) Higher Doctorate
(8) Other *(please specify below)*
....

AY5a... Please identify the undergraduate study content areas in which you CURRENTLY TEACH. (select as many as apply)
Building Materials
Building Science
Building Services
Business Management
Communication and Documentation
Computer Skills
Construction Technology
Cost Control
Drawing and Surveying
Economics
Environment
Estimating and Tendering
Facilities Management
Health and Safety
Law
Measurement or Quantity Surveying
Procurement
Project Management
Quality Management
Research
Risk Management
Structures
Sustainable Development

AY5b... Please identify the undergraduate study content areas in which you HAVE PREVIOUSLY TAUGHT (select as many as apply)
Building Materials
Building Science
Building Services
Business Management
Communication and Documentation
Computer Skills
Construction Technology
Cost Control
Drawing and Surveying
Economics
Environment
Estimating and Tendering
Facilities Management
Health and Safety
Law
Measurement or Quantity Surveying
Procurement

Project Management
Quality Management
Research
Risk Management
Structures
Sustainable Development

AY6... From the following list, please choose the primary discipline which most closely aligns with the content you teach.
(1) Construction Management
(2) Quantity Surveying
(3) Building Surveying

AY7... How many years have you been teaching in this primary discipline?
(1) 0-4 years
 (2) 5-10 years
(3) 11-20 years
(4) 21-30 years
(5) Over 30 years

AY8a... Have you had a promotion during this time?
(1) No, never
(2) Yes, once
(3) Yes, twice
(4) Yes, three times
(5) Yes, four or more times

AY8b... For each of your promotions, please indicate
the academic level you held prior to promotion
the level to which you were promoted
the year of your promotion

Promotion 1
(1) Associate/Assistant Lecturer
(2) Lecturer
(3) Senior Lecturer
(4) Associate Professor
(5) Professor
Level prior to promotion
Year of Promotion

Promotion 2
 (1) Associate/Assistant Lecturer
(2) Lecturer
(3) Senior Lecturer
(4) Associate Professor
(5) Professor
Level of promotion
Year of Promotion

Promotion 3
(1) Associate/Assistant Lecturer
(2) Lecturer
(3) Senior Lecturer
(4) Associate Professor
(5) Professor
Level prior to promotion
Year of Promotion

Promotion 4
 (1) Associate/Assistant Lecturer
(2) Lecturer
(3) Senior Lecturer
(4) Associate Professor
(5) Professor
Level prior to promotion
Year of Promotion

AY8c... During your employment have you had any of the following additional roles or responsibilities? (select as many as apply)
Dean
Assistant Dean
Supervisor for Postgraduate/s
Research Director
Head of School
Head of Department or Discipline
Course Coordinator
Other *(please specify below)*
No additional roles or responsibilities
....

AY9... How many years industry experience do you have in the area in which you teach?
(1) 0
(2) less than 2 years
(3) 2 - 5 years
(4) 6 - 10 years
 (5) 11 - 20 years
(6) 21 - 30 years
(7) more than 30 years

AY10... Are you currently working in a part-time capacity in an industry related to the discipline in which you
primarily teach?
(1) Yes
(2) No

AY10a... How many years has it been since you worked in the industry?
(1) less than 1 year
(2) 1 - 2 years
(3) 2 - 3 years
(4) 3 - 4 years
(5) 4 - 5 years
(6) more than 5 years

AY11... How long have you been employed at your current university?
(1) 1 - 3 years
(2) 4 - 6 years
(3) 7 - 10 years
(4) 11 - 20 years
(5) more than 20 years

AY12... Have you worked at more than one university during your academic career?
(1) Yes
(2) No

AY12a... Were any of the Universities you changed to in a different State?
(1) Yes
(2) No

AY12b... Why did you change Universities?
(select as many as apply)
For promotion/ pay increase
End of contract
Personal reasons
Research opportunities
To teach in your speciality area
Other *(please specify below)*
....

Curriculum Issues
CI1... Please consider each of the following factors and rate their importance to your primary discipline.
Not at all
important
Not very
important
Important
Very important
Extremely important

a... Curricula should not be overcrowded
b... Students, as part of their degree, have the opportunities to take elective subjects outside of their discipline
c... Students should be provided with opportunities to learn in online environments
d... Relevant industry experience is an essential component of a student's education
e... Industry involvement should be encouraged (for example: guest lectures, employee scholarships)
f... Relevant and current computer software should be incorporated in teaching
g... Visits to construction sites

CI2... In your opinion, what are the 3 most significant issues facing your discipline?

a... Issue 1 ....

b... Issue 2 ....

c... Issue 3 ....

CI3... Please list 3 changes you would like to see in your discipline?

a... Change 1 ....

b... Change 2 ....

c... Change 3 ....

CI4... Can you identify 3 key obstacles to implementing these changes?

a... Obstacle 1 ....

b... Obstacle 2 ....

c... Obstacle 3 ....

Learning, Teaching and Generating Academic Knowledge
LT1... In your opinion, how many contact hours per week are necessary for full-time students to reach their full potential in your primary discipline?
(1) less than 12 hours
(2) 12 - 15 hours
(3) 16 - 19 hours
(4) 20 - 24 hours
(5) more than 24 hours

LT2... In your opinion, how important are the following student skills?

Not at all
important
Not very important
Important
Very important
Extremely important
N/A
a... Critical thinking
b... Teamwork
c... Written communication
d... Oral presentation
e... Visual presentation
f... Time management
g... Problem solving
h... Assignment writing
i... IT skills

LT3... Please indicate your level of agreement with each of the following statements about student attitudes.
Strongly disagree
Disagree
Neutral
Agree
Strongly
agree
N/A
a... Students regularly attend my classes.
b... Student absenteeism does not impact on students' learning.
c... Students rarely complain about their workload.
d... Students often take on part-time employment whilst completing their studies.
e... Students are increasingly expecting entertainment-oriented lectures.
f... Students readily accept constructive feedback.
g... Students are able to give critique of their own and others' work.
h... Students are motivated to achieve high grades.

LT4... Do you think students' expectations of teaching have changed over the past 5 years?
(1) Yes
(2) No
(3) I haven't been teaching for the past 5 years

**LT4a... Please list the three most significant ways that student expectations of teaching have changed over the past
5 years.**

Change 1 ………………………………………………………………

Change 2 ………………………………………………………………

Change 3 ………………………………………………………………

LT5... How many assessment tasks do you generally set in a course in one semester?
Note: The term 'course' could refer to 'module', 'study area' or 'unit' at some schools
(1) 0
(2) 1
(3) 2
(4) 3
(5) 4
(6) more than 4

LT6... Has your discipline increased its use of online environments for administering assessment tasks over the past 5 years?

(1) Yes
(2) No
(3) Don't know

LT7... Have staff in your discipline increased giving electronic feedback on assessment items over the past 5 years?
(1) Yes
(2) No
(3) Don't know

LT8... In your typical assessment practice, how important is it to provide the following?
Not at all important
Not very important
Important
Very important
Extremely important
N/A
a... Detailed description of levels of attainment (rubric), at the beginning of an assignment
b... Written feedback for students' assessment items (formative)
c... Verbal feedback for students' assessment items (formative)
d... A grade (summative) for assessment items
e... Online assessment as opposed to hardcopy assessments
f... Several assessment items

LT9... Please identify the most effective methods you use to update your knowledge of teaching practices (up to 5 methods can be selected).
(Place a 1 in the box next to the method that is most useful for you to update your knowledge of teaching practices; if you wish to select more than one method, use the numbers 2, 3, 4 and 5 to indicate the next most useful methods in order of effectiveness.)
a... Academic conferences
b... Education conferences
c... Academic journals
d... Web sites and e-newsletters
e... Attendance at workshops/seminars/short courses
f... Networking
g... Belonging to professional or academic associations
h... Postgraduate study
i... Being a member of the School and Practice Advisory Board
j... Being up to date with Industry
k... Other *(please specify below)*
....

LT10... Please identify the methods that you use to keep abreast of current industry developments in the area/s in which you teach (up to 5 methods can be selected).
(Place a 1 in the box next to the method that is most useful for you to keep abreast of current industry developments in the area/s in which you teach; if you wish to select more than one method, use the numbers 2, 3, 4 and 5 to indicate any other methods that you use.)
a... Academic conferences
b... Academic journals
c... Industry journals and magazines
d... Websites and e-newsletters
e... Attendance at workshops/ seminars/ short courses
f... Networking
g... Belonging to professional or academic associations
h... Postgraduate study
i... Being a member of the School and Practice Advisory Board
j... Professional body (AIB, AIQS, AIBS etc.)
k... Other *(please specify below)*
....

LT11... Please indicate if you use any of the following approaches in your Discipline.
Do not use/ Do not intend to use
Currently use
Intend to use
Not applicable to my teaching practices
a... Learning contracts
b... Simulation projects
c... Peer assessment
d... Self assessment
e... Group work
f... Other *(please specify below)*
....

LT12... Does your institution offer an online degree program for your Discipline?
(1) Yes
(2) No
 (3) Intending to implement

LT12a... Does your online program run concurrently with your on-campus program?
(1) Yes
(2) No
(3) Intending to implement

LT12b... Does the delivery of virtual team work skills form part of your online program?
(1) Yes
(2) No
(3) Don't know

LT12c... Is students' participation in virtual team work an assessment component in your online program?
(1) Yes
(2) No
(3) Intending to implement

LT13... In the future, does your University intend to change the length of the degree program in your discipline?
(1) Yes
(2) No
(3) Don't know

LT13a... Please indicate the length change.
(1) Decrease from 4 to 3 years
(2) Increase from 4 to 5 years
(3) Other *(please specify below)*
....

LT14... In the table below, please indicate the teaching and learning development in which you have participated in 2006 and 2007, and have planned for 2008.
2006 2007 2008
a... Induction programs
b... Symposium/ Conference
c... Workshop
d... One-on-one advice from a teaching and learning adviser
e... Peer review of teaching
f... Teaching development grants
g... Higher degree study in university teaching and learning
h... Other *(please specify below)*
....

Academic Staff Conditions

AS1... In an average week, how many hours do you work to complete your academic responsibilities?

(1) less than 38 hours
(2) 38 - 43 hours
(3) 43 - 49 hours
(4) 49 - 55 hours
(5) 55 - 65 hours
(6) over 65 hours

AS2... Across a year, how is your academic work broken down into the following activities?
Your responses should be percentages and total 100.

% .... Teaching
% .... Research
% .... Administration
% .... Other *(please specify below)*

AS3... From your current teaching experiences, what are the 3 most significant strengths of your teaching?

Strength 1 **…………………………………………………………………**

Strength 2 **…………………………………………………………………**

Strength 3 **…………………………………………………………………**

AS4... From your current teaching experiences, what are the 3 most significant issues affecting the strengths of your teaching?

Issue 1 **…………………………………………………………………**

Issue 2 **…………………………………………………………………**

Issue 3 **…………………………………………………………………**

AS5... In the next five years, what are the 3 most significant challenges that you expect to encounter in your teaching?

Challenge 1 **…………………………………………………………………**

Challenge 2 **…………………………………………………………………**

Challenge 3 **…………………………………………………………………**

AS6... Are there any other issues that have significantly affected your teaching career?

………………………………………………………………………

AS7... From the following list, please select the greatest areas of need confronting your discipline's teaching practices (Up to 5 needs can be selected).
(Place a 1 in the box next the greatest area of need; if you wish to select more than one area, use the numbers 2, 3, 4 and 5 to indicate the next greatest areas of need.)

a... Tutorial spaces
b... Lecture rooms/ theatres
c... Computer laboratories
d... Up-to-date visual equipment
e... Up-to-date academic books/journals
f... Staff offices
g... Student meeting rooms
h... Increase in staff numbers
i... Professional development
j... Curriculum reforms
k... Staff and student internet access
l... Online teaching and learning resources
m... Other *(please specify below)*

………………………………………………………………………

AS8... What are the current impacts of your school's budget and OHS on the following areas?
N/A
impact
Some impact
Large impact
a... Site visits
b... Workshop activities
c... Other *(please specify below)*
....

AS9... In your opinion, how important is the accreditation process to:
Not at all important
Not very important
Important
Very important
Extremely important
N/A
a... Maintain standards
b... Set an agenda for future directions

AS10... Please indicate your level of agreement with each of the following statements.
Strongly disagree
Disagree
Neutral
Agree
Strongly agree
N/A
a... Preparation for accreditation increases my workload.
b... Feedback from the accreditation process has improved the school's curriculum.
c... The accreditation process encourages diversity in my discipline.
d... The accreditation process is valued by the academic community.

AS11... Any further overall comments?

…………………………………………………………………………

APPENDIX 4

List of presentations and publications

Williams A, Sher W, Simmons C and Dosen A (2008)

Teaching and Learning in the 'Lean Time': Researching the Issues and Opportunities Confronting Tertiary Building Education in Australia, presented at the Australasian Universities Building Education Association Conference, 2008, Unitec, Auckland, New Zealand. 10–11 July **(Keynote presentation)** http://www.aubea.org.au/ocs2/index.php/AUBEA/2008/index

Williams A, Sher W and Simmons C (2008)

Challenges and Opportunities for Construction Education in Australia. Paper presented at the Australasian Association for Engineering Education Conference, Yeppoon, 7–10 December. Editors Llewellyn Mann, Adam Thompson & Prue Howard. Central Queensland University Australia. p 1–6, ISBN 1 921047 60 7 http://www.events.rockhamptoninfo.com.au/aaee-2008-program

Williams A, Sher W and Simmons C (2009)

Balancing changes to Construction education in the 21st century: exploring the challenges construction educators face in Australia. To be presented at the Australasian Universities Building Education Association Conference, 2009, University of South Australia, Adelaide. 7–10 July http://www.unisa.edu.au/nbe/AUBEA09/default.asp

AUBEA Forthcoming Workshop details: To be facilitated at the Australasian Universities Building Education Association Conference, 2009, University of South Australia, Adelaide. 7–10 July http://www.unisa.edu.au/nbe/AUBEA09/default.asp