

# Secondary School Students in Construction Higher Education

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## ABSTRACT

Progressing from school to university presents high school students with a range of daunting challenges. In recent years universities have found it difficult to attract students from secondary school with increases in university cohorts being dominated by older students. This paper describes a program to attract school students to built environment disciplines by providing them with opportunities to enter a gifted and talented scheme. The scheme involves the delivery of a first year built environment university course to a limited number of year 10, 11 and 12 students. It aims to attract high-achieving school students (especially females) to these programs and allow them to complete a first year course in tandem with their secondary school studies. The paper describes the pilot implementations of the scheme, the ways in which the students engaged with their studies, and the support they received from the university and schools. The paper summarises student and staff feedback and concludes by identifying the generic strategies that supported this initiative.

## KEYWORDS

Secondary school, transition to university, attracting students, built environment education.

## INTRODUCTION

In 2010 the University of Newcastle and the NSW Department of Education and Training entered into a partnership to provide opportunities for secondary school students to study construction related higher education courses. A 'Career Acceleration Program' (CAP) was offered to high school students who were committed to a career in construction. The

CAP was conducted in conjunction with Callaghan College. The College is a multi-campus NSW DET secondary school located in the northwest corridor of Newcastle. It is committed to delivering opportunities for all students to succeed in a caring environment and consists of Wallsend Campus for Years 7-10, Waratah Technology Campus for Years 7-10 and Jesmond Senior Campus for Years 11-12. The college has approximately 2400 students and over 300 staff, spread over the three separate campuses. The CAP provides a pathway for students from the eight high schools participating in the Newcastle Community Trade Training Centre (NCTTC) to complete first year university courses whilst attending school. The CAP was successfully piloted during Semester 1, 2010. It was delivered again in Semester 2, 2010 and is being offered again in 2011. The manner in which the CAP was managed and delivered is described below.

## **PROJECT METHODOLOGY AND PURPOSE**

Students find the transition between secondary school and university to be tumultuous. A wide range of degree programs is available to them, and they find it confusing and challenging to make their choice. Their experience and understanding of these programs is, in many cases, not well-informed. They frequently select a degree program based on limited research and with only a superficial understanding of the cultural or gender contexts of their choices. If students are gifted and talented, their choices are even more fraught. Not only do they have an even broader array of career options to choose from – they need to contend with the extra pressures placed on them by the high expectations of their family and peers.

This project was designed, in part, to provide students with experiences that broaden their horizons during this decision-making period. The aims of the project were to:

- provide a diverse range of study options to gifted and talented school students;
- expose female students to non-traditional pathways in higher education;
- demonstrate to students the diversity of career pathways that exist within the built environment;
- expose students to online learning experiences; and
- evaluate the potential of such a program to a wider community.

There are few published studies reporting experiences of high school students studying at university. Those that were located relate to summer school activities where high school students were involved in various activities in universities' science faculties (Atwater, Colson, & Simpson, 1999; Bleicher, 1996; Knox, Moynihan, & Markowitz, 2003). There is thus little precedent against which the CAP may be considered.

### *Application Process*

The number of students admitted to the CAP was limited to six in each semester. Recruiting and selecting students was important to both partners. Particular attention was paid to publicising the CAP, recruiting students, and managing the various activities involved. The recruitment process involved students completing an application form and attaching their latest school report. Shortlisted students were then interviewed. The criteria used to select applicants were based on the characteristics of successful university students and included their:

- commitment to a career in architecture, construction and the built environment;
- ability to complete the course in addition to School Certificate or Higher School Certificate studies;
- commitment to completing the course requirements;
- time management skills;
- ability to work independently and collaboratively;
- appropriate communication and technology skills; and
- problem solving skills.

Students' perceptions of their abilities to address these criteria were provided to the interview panel. These were explored by the panel during the interview and formed the basis upon which offers were made. The selected students were then enrolled at the University of Newcastle. They paid a fee of \$400 to cover the management of the program whilst the School of Architecture and the Built Environment paid the remainder of fees. Scholarships were available for students from low socio-economic backgrounds.

### *Newcastle Community Trade Training Centre*

The NCTTC recently received \$13.5million from the Commonwealth Government to upgrade vocational training facilities in the participating high schools as shown in Figure 1. The CAP provides students with opportunities to fulfil their academic potential, help with career decisions, and potentially leading to credit for future university studies. It is managed by Callaghan College, but is open to students from all NCTTC schools.

The project promotes careers in architecture, construction and the built environment, and provides an accelerated pathway to students' career goals. The CAP was promoted to students in Years 10, 11 and 12 in October and November of 2009. Five students participated in the Semester 1 pilot in 2010. Three students were in Year 10, one in Year 11 and one in Year 12. Only one female student participated in the program. The students who enrolled in the program were chosen through a formal interview process. In Semester 2 five Year 10 male students were selected to participate in the program.



- generating design presentations that demonstrate a good use of layout principles.

These skills are the basic mode for communication in the building industry.

*Communication in the Built Environment 2* is offered to first year architecture and construction management students, and is often taken as an elective by other students. It is offered in a blended-mode, with on-campus students attending lectures (1 hour / week) and face-to-face tutorials (2 hours / week). Distance learners work electronically by listening / viewing recordings of lectures and by completing tutorial exercises (which are supplemented with online help files which incorporate step-by-step instructions). All students have access to dedicated Blackboard learning management system web pages including electronic discussion boards. The postings on these discussion boards provide students with valuable help, as they are able to ask questions and comment on the input of others. The course coordinator monitors all discussion board postings. It frequently occurs that a query posted by one student is answered by another.

Learning activities are structured around an introduction to CAD, the development of a CAD model and its refinement. The course is assessed in a variety of ways as shown in Table 1. The first assignment (A1 parts A and B) were tests in Blackboard that monitored students' general progress as well as their ability to work with the basic commands of the software (ArchiCAD and Adobe Photoshop). The second and third assignments are individual projects. Students had to select one of six family homes for which they received an incomplete set of drawings. For assignment A2 they were required to analyse and develop missing information (e.g. elevations) based on the information provided. Finally, they had to create a CAD model of their project and generate a complete set of drawings. Assignment A3 focused on the presentation of their project – the plan layout and the quality of their digital design (i.e. their rendered images).

**Table 1 – Assessment items and weightings**

<b>Assessment Item</b>	<b>Contribution</b>
A1 part A _ Online quiz	5%
A2 _ CAD modelling project	40%
A1 part B _ Online quiz	5%
A3 _ Digital design and layout	50%

### *The Blackboard learning management system*

Use of the Blackboard online learning environment was the key to the CAP. It provided students with the flexibility to avoid timetable clashes between school and university activities, as well as with other school-based activities e.g. excursions, exams etc. In addition, it provided students with the challenge of managing their time and study

strategies. Distance-learning is not a foreign concept to secondary school students but the opportunity to study an online course at the university level is novel.

## **LESSONS FROM THE PILOT IMPLEMENTATIONS**

The pilot implementations of the CAP have not been without challenges. A reflective meeting after the Semester 1 CAP identified a need for more meetings with the students, particularly at the beginning of the course. These became an integral part of the Semester 2 CAP, with the high school principal meeting with students on a regular basis. In addition, students were advised to attend face-to-face tutorials wherever possible. The Year 12 student found it difficult to cope with the demands of their HSC as well as the CAP, and Year 12 students have now been excluded from the program. Communication between the course coordinator and the students has also been more frequent and communication with the in-school mentors has improved. A role statement for the mentors needs to be developed.

### *The school principal's perspective*

This CAP is different to other acceleration programs delivered by the University of Newcastle in that the focus is on career development in vocational education and training areas. It provides a seamless pathway to university for gifted and talented students to careers in architecture, construction and the built environment. As students complete a university course before finishing school, they are encouraged to continue their education at university. Students also have a good introduction to the University of Newcastle and the standard of work expected. All of the students in the Semester 1 and 2 CAP indicated that, on leaving school, they intended to continue their studies at the University of Newcastle. Another unique feature of this program was that students completed the course through online learning. There was no need for them to attend University lectures or tutorials (although some students did attend these activities).

Students were very excited to be included in the program, but very apprehensive at first. They were assigned a school mentor to assist them with their study program. They also had the support of a program coordinator from Callaghan College. A preliminary meeting was held at the University for the students and their parents. At this meeting the students were provided with an overview of the Blackboard Learning Management System and the course and assessment expectations. The students also had another meeting with the course coordinator and the school principal towards the end of the program.

The Callaghan College principal found the support from university staff to be “outstanding”. All involved worked as “a really effective team” enhancing the CAP experience and supporting the students. The benefits for the participating students were

considerable. They relished the challenge and were very proud to have successfully completed the course. One parent reported that her son had been changed through his participation in the course and that his self esteem, self confidence and organisational skills had greatly improved. In a survey of Semester 2 parents, all of them rated the program as excellent and said that they would recommend this program to others.

### *Student results*

A program such as the CAP can only be judged when it is tested or by its results. The students' final grades are thus an important measure of success for the program. It must be remembered that these students had to adapt to university expectations whilst studying independently. The following are their results:

#### Semester 1

- Year 10 students – all male – two Passes and one Distinction.
- Year 11 student – male – Credit.
- Year 12 student – female – Pass.

#### Semester 2

- Five Year 10 students - all male –two Distinctions, two Credits and one Pass.

### *Feedback from students*

Students completing the program echoed the observations of Taylor who noted that “the majority of (participants) expressed confidence, enthusiasm and satisfaction over the transition process and early career experiences.” Taylor (2004). The following are some of their observations:

- *“Great opportunity”.*
- *“Really enjoyed the program and found it challenging. The work was time consuming but I had no difficulty managing the work”.*
- *“I needed help with the first assignment so that I knew the standard that was expected”.*
- *“The discussion board on Blackboard was useful. I didn't feel confident enough to post a question but I liked to read the comments from the other students”.*
- *“I really enjoyed the course. I will use this subject in my Degree”.*
- *“This program has impacted on my subject choice, career goals and self-confidence”.*
- *“The course was really good and exciting. It gave an introduction to the University environment and atmosphere and I recommend it to other students... It was really informative and knowledge providing. The Blackboard was really exciting”.*

- *“The course has definitely been a positive experience. It has been a good introduction to the University of Newcastle. I would highly recommend this course to other students”.*
- *“The benefit of the program was having an understanding of a career path before taking that path”.*
- *“The course has greatly benefitted me and has been a fantastic experience that I will never forget. I would highly recommend this course to other students who would like to succeed further in their studies”.*
- *“This course was a great experience in the University atmosphere. It gave a good overview of expectations and required skills to complete the course”.*
- *“This course provides a good introduction to the University experience and a good link between high school and the university.”*

#### *Feedback from the Project Officer*

A Project Officer was employed by Callaghan College on behalf of the NCTTC, working one day per week on this program as well as on others. On completion of the Semester 1 pilot, the Officer made several observations about the CAP, including that the initial orientation and related paperwork needed to be completed prior to start of the course. Students needed to ensure they were registered on the University’s website and enrolled in the correct course prior to the start of semester. Students should email the course coordinator and familiarise themselves with Blackboard. In addition, students should sign a form confirming that they have read and understood when assignments are due. Hand-in dates for the assignments were highlighted in their University information pack but students needed to be aware that if they are completing a University course they had to take ownership of submission dates. Parents also needed to be aware of this.

Further points identified by the Project Officer included the need for a support person (mentor) to be identified prior to the start of the course. This person should be based at the student’s own school and should receive a letter outlining the CAP and what their involvement in it was.

Students should contact the course coordinator regularly to let them know how they are progressing. They should also contact mentors prior to and after each assignment. After each assignment the Program Coordinator from Callaghan College should have a follow-up discussion with each student individually or as part of a group to see how they are coping and how they found each assignment.

### *Feedback from school mentors*

Callaghan College arranged for students to be supported by mentors at their respective schools. The following are a selection of the comments they made:

- *“The students need someone to hold their hand from the start. They are not familiar with how to navigate on Blackboard and its role and purpose other than tutorials and assessment and its capacity in relation to communication channels need to also be explored. While some support material was provided on how to correctly reference work- knowledge about what is a reliable source and what is considered acceptable was a big learning curve. Students consider that Google and Wikipedia are OK! Greater support is needed in this area.” (Mentor 1)*
- *“I made regular contact with my students. On each occasion they said that they were making good progress and didn’t require any extra assistance.” (Mentor 2)*
- *“The student that I was supporting was from a disadvantaged background and had difficulty accessing a computer with sufficient memory for the CAD program. I was able to organise a computer for him to access and he worked in the University library”. (Mentor 3)*

### *Feedback from University*

The CAP provided an ideal opportunity for universities to reach out to local schools. Publicising the CAP raised awareness of built environment courses to staff and students at these schools. The interactions with Callaghan College have been warm and constructive, and have encouraged closer participation between those involved (this paper being evidence of such interaction). The University will continue to support the College and the NCTTC wherever it can.

Both *Construction Ecology 1* and *Communication in the Built Environment 2* are offered on-line and as electives, and resulted in minimal additional workload. Some additional support for CAP students was provided, but rather than being onerous, staff were heartened by the enthusiasm of the students and Callaghan College staff.

### **NEXT STEPS**

As a result of the experience gained during these pilot implementations, the CAP is continuing in 2011. Up to six students will be offered places in Semester 1 and 2. They will enrol in the same two courses described above.

The assignment tasks and the mode of delivery develop students’ problem-solving skills. They work autonomously and develop a spirit for teamwork by helping each other (both in online discussions and in face-to-face tutorials). This introduces them to the university

environment and supports them in transitioning between high school and university. Notwithstanding these opportunities, it was found that the students needed to develop other skills such as time management and being better organised. An online orientation and induction will help students gain an appreciation of what is expected at university and will become a requirement for future students.

## **CONCLUDING COMMENTS**

The trials of the CAP have proven to be a success from a number of perspectives. That the school students were able to succeed at university level is an achievement in itself. However, this is even more noteworthy as the students were working predominantly by themselves and in an online environment. The confidence they have gained will stand them in good stead for their future endeavours. From the University's perspective, the CAP provided an excellent opportunity to reach out to local schools and raise awareness of the varied opportunities available in the built environment. Announcements at school assemblies and meetings ensured that the construction industry (so often associated with muddy boots, and unattractive working conditions) was seen in a different light. The promotion of the CAP program in schools has raised the profile of careers in architecture and the built environment. There was a 30% increase in the number of applications for the 2011 program. Another extremely positive outcome from the University's viewpoint is the intention of the students to continue their studies at Newcastle University.

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