

Pathways To University: Enabling Factors in Construction Management Education in Australia

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Past Australian and international research has shown that many students find transition and navigating pathways from vocational education to university difficult. This paper proposes a framework for evaluating the success of these pathways in construction management education. Students enrolled in undergraduate degree courses responded to a questionnaire on the nature of their experiences in vocational education and how this impacted on their decision to articulate to university. The survey covered a sample of three universities across Australia. The results showed that students generally had positive experiences, but that some pathways had better outcomes than others. Utilising an existing outreach-developed matrix the research identified three factors that were good measures of the success of pathways models. The paper concludes by suggesting that universities need a greater awareness of the impact of transition issues for their pathways students. This research is significant in that it considers pathways as an organised and systematic process, which is capable of being defined and measured.

Key words*:* Construction education, student employment, pathways

Introduction

Models of collaboration between Vocational Education and Training (VET) and Higher Education (University) are not new in Australia. Articulation, dual awards, credit transfer arrangements, VET-University guaranteed pathways, nested awards and collaborative curriculum partnerships have all existed for some time in Australia (Sinclair et al 2003). In addition to providing multiple exit and entry points, these models have all sought to address the gulf between the vocational education sector and the HE (university) sector.

However, concern has been expressed for some years in Australia about the articulation and credit transfer arrangements between Vocational Education and Training (VET) and Higher Education (HE). This has arisen due to issues about access and equity and the different roles of the university and vocational sectors (PhillipsKPA 2006). The more traditional models of transition have focused upon credit transfer and articulation of previous courses or qualifications, particularly those obtained in the vocational or technical education sector (Younge 2007). According to MacKenzie (2006) it is suggested that credit transfer and articulation arrangements broaden students' study pathways and encourage "higher educational attainment" (p.17). However, such models are weighted heavily towards a "time served" approach to learning, where credit or exemptions for existing qualifications are translated into reduced contact hours in higher education studies.

Doughney (2000) underlines this point noting "standardised learning pathways are usually based on sequential movement from one course to the next" (p.63). These models assume a progression of qualifications, commencing with a technical or vocational qualification and progressing onto a university qualification. The underlying assumption is one of progressive time-served qualifications, rather than a pathways model focusing exclusively upon learning and learner behavior. Whilst models of articulation and credit transfer have existed for a number of years, the actual implementation has also proved to be difficult. As Bradley et al (2008) noted 'various efforts to strengthen the connections between higher education and vocational education have been made in Australia over the last

twenty-five years with limited success, due to structural rigidities as well as to differences in curriculum, pedagogy and assessment' (Bradley et al. 2008) p. 179). Key issues of accessibility of relevant, accurate pathways information and structures continue to plague the tertiary sector in Australia.

Many researchers have identified the complexities of pathways models as an impediment to up-skilling of students. Moody et al (2009) pp. 172-173 claims that students who do not proceed to HE from vocational education and training (VET) are not on the whole prevented by barriers, but rather do not aspire to HE. Other work undertaken by PhillipsKPA (2006) showed that, even in institutions proactively working to promote articulation and credit transfer, 'barriers continue to hamper efforts and…pathways do not always operate as smoothly, efficiently or effectively as they might' (PhillipsKPA, 2006, p. ii)

In a series of in-depth interviews with students who had experienced learning in both sectors, Harris et al (2006) found that, rather than clear pathways, students' learning journeys were more like stepping stones, zigzags or crooked paths. This was due to lack of information and guidance, lack of 'fit' between courses, inexperience and not having the course prerequisites. This paper examines the effectiveness of vocational education to higher education access (pathways) in construction.

Literature Review

A number of pathways models are currently in use in Australian universities and make a successful contribution to the aim of increasing the participation of more diverse groups in higher education. In a number of cases, these models are examples of a commitment to diversity and a more equitable higher education sector that represents access for all Australians.

Pathways in education must provide an educational ladder of opportunity if the efficiency objective is to be met and a social ladder of opportunity if the equity objective is to be met (Wheelahan 2009). These two purposes go together for those from disadvantaged backgrounds because access to education is one of the key ways in which occupational progression and social mobility can be achieved. However, these two objectives are not always aligned. Stuart (2002) believes that we need to distinguish between measures that deepen participation in education by providing more opportunities and access for particular social groups already represented in education, and those that widen participation by including groups that are under-represented

The research is part of a broader Australian Learning and Teaching Council (ALTC) study examining pathways models in construction. The primary objective of the ALTC funded project is to determine the effectiveness of pathways in improving the diversity of the student cohort in higher education. In recent years the primary focus of access-oriented programs has shifted to raising students' aspirations for higher education (Gale et al. 2010). Drawing on the international research literature, Gale (2010) found that programs that raise aspiration are quite likely to increase the number of disadvantaged students going on to higher education than otherwise would have been the case. These programs exhibit at least 3 (from 4) implementation strategies (Displayed as the columns), 4 (from 10) design characteristics (Displayed as the rows), and 2 (from 3) equity orientations (see Figure 1).

Assembling Resources	**Engaging learners**	**Working together**	**Building confidence**
People-rich	Recognition of difference	Collaboration	Communication and information
Financial support and/or incentives	Enhanced curriculum	Cohort-based	Familiarizations/site experience
Early, long-term, sustained	Research-driven		
	Equity Orientation		

Unsettling deficit views	Research, local knowledge, and negotiation local interventions	Building capacity in communities, schools, and universities

*Figure 1***:** The model of effective outreach known as the DEMO matrix (Source: Gale, Sellar et al. 2010: 12)

These characteristics, strategies and perspectives form the basis of a meta-analysis, named the Design and Evaluation Matrix for Outreach (DEMO). Gale (2010) believes that the outreach program design, implementation and equity orientation are significant factors contributing to the likelihood of making a difference for disadvantaged students. In these terms, the overall effectiveness of a program will depend on the combination of depth (the number of characteristics), breadth (the number of strategies), and equity orientation (the number of equity perspectives).

The DEMO matrix provides indicative guidance for the analysis of any program in terms of effectiveness, including the dynamics produced by different combinations of characteristics and strategies. It should be noted that in the original DEMO not all characteristics were required to be evident in each outreach program in order for it to be successful. Instead, the DEMO matrix was used to calculate a score across the four broad categories of the matrix. The DEMO has been modified as the basis of testing the effectiveness of pathways from vocational education to university in this research. Although the DEMO was not specifically developed for this purpose, it provides a useful model that can analyze the design and implementation of a pathway. A questionnaire was designed based on the DEMO matrix (Gale et al 2010). The questionnaire focuses on the experiences that university students have been exposed to while in vocational education, which have permitted successful pathways.

Research Method

This research was based on a paper-based questionnaire, (see appendix) which contained questions adapted from the DEMO matrix. Three academic staff from Deakin University, RMIT, and University of Western Sydney were contacted; each were asked if they would assist by offering a survey to their students in Construction Management courses. Students were asked to respond to questions on their personal experiences during their prior vocational education study. The survey forms were given to each course coordinator for distribution to students in class. The completed survey forms were returned anonymously into a closed box. The data was entered into an Excel spread-sheet, which was later converted in to SPSS for analysis. In addition, each course coordinator was asked to specify the total number of students enrolled in their courses. The overall response rate was 33% (179/542) indicating that the survey represents a sufficiently large sample of the courses in Australia. The next section presents the results of the questionnaire, and development of a modified model that can be used to evaluate the success of pathways.

Results

Table 1 shows the mean score of each of the questions in the survey. The results indicate that the highest score 5.52 (of 7) was Q14.3 *There was good communication with the other students in vocational education.* The lowest score was 4.15 was Q11.3 *I was able to access funding support for my VET* . It is interesting to note that all scores were above 3.5 (of 7) indicating that students generally agreed with the statements.

The survey comprised a series of questions based the DEMO framework mentioned above. Each student was asked to agree or disagree with a series of statements on a 7-point Likert scale; the results were analysed using Factor Analysis. The data was then analyzed by using SPSS v.10 so as to bring the interrelated variables together and to identify the underlying principal factors affecting their pathways to university. Exploratory factor analysis was employed because it is a statistical tool useful in bringing insights into the relationship among numerous correlated, but seemingly unrelated variables in terms of a relatively few underlying factors (Overall & Klett 1972).

Components (or factors) were extracted by Principal component analysis with Varimax rotation. This method can help by achieving a simple structure by minimizing any tendency towards a “general” component in the solution (Gorsuch, 1983). The number of components extracted was based on their respective eigenvalues.

Table 1.

Survey Reponses

Likert Score (Strongly 1 disagree) to 7 (Strongly agree)	**Mean**	**St Dev**
Q11.1 VET created opportunities for me to talk to others about the industry or further study (People rich)	4.94	1.59
Q11.2 I was mentored throughout the VET programme (People rich)	4.38	1.79
Q11.3 I was able to access funding support for my VET (Financial support)	4.15	2.02
Q11.4 The VET programme I did was well known and had been running for a long time	5.33	1.63
Q12.1 My education from VET was valued at university	4.51	1.96
Q12.2 VET people encouraged me to undertake University (Recognition of difference)	4.32	1.91
Q12.3 The VET programme prepared me well for University (Enhance academic curriculum)	4.84	1.82
Q12.4 VET was interested in my preparation for University	4.37	1.83
Q13.1 VET and university work well together for students	4.37	1.73
Q13.2 I received good support when I did work in groups of peers while in VET. (Cohort-based)	4.98	1.40
Q13.3 The other students in VET supported me well	5.19	1.45
Q14.1 I had access to sufficient resources and appropriate teaching material in VET (Communication and information)	5.07	1.47
Q14.2 There was good communication with the teachers in VET. (Communication and information)	5.40	1.54
Q14.3 There was good communication with the other students in VET. (Communication and information	5.52	1.21
Q14.4 VET gave me practical experience which helped me understand the requirements of university (Familiarisation)	5.35	1.56

Table 2

Factor Analysis DEMO matrix

Factor Component	**1**	**2**	**3**
Q11.1 VET created opportunities for me to talk to others about the industry or further study (People rich)	.261	.063	.786
Q11.2 I was mentored throughout the VET programme (People rich)	.269	.275	.690
Q11.3 I was able to access funding support for my VET (Financial support)	-.109	.312	.657
Q11.4 The VET programme I did was well known and had been running for a long time	.507	-.038	.556
Q12.1 My education from VET was valued at university	.161	.656	-.005
Q12.2 VET people encouraged me to undertake University (Recognition of difference)	.230	.794	.203
Q12.3 The VET programme prepared me well for University (Enhance academic curriculum)	.389	.620	.364
Q12.4 VET was interested in my preparation for University	.229	.765	.145

Q13.1 VET and university work well together for students	.214	.676	.206
Q13.2 I received good support when I did work in groups of peers while in VET. (Cohort-based)	.775	.372	.119
Q13.3 The other students in VET supported me well	.781	.291	-.055
Q14.1 I had access to sufficient resources and appropriate teaching material in VET (Communication and information)	.748	.310	.175
Q14.2 There was good communication with the teachers in VET. (Communication and information)	.666	.301	.359
Q14.3 There was good communication with the other students in VET. (Communication and information	.731	.133	.276
Q14.4 VET gave me practical experience which helped me understand the requirements of university (Familiarisation)	.392	.409	.272

The salient variables in each component were identified and used as the indicators for explanation. These salient variables were selected by two criteria. First, their loading values should be significantly high (minimum 0.4) and second, they should only be loaded on the extracted factor (Gorsuch, 1983). As shown in Table 2, the salient variables identified for each extracted factor are in all but one case higher than 0.4, reflecting a substantial degree of contribution of each variable to its extracted factor. The results of this analysis are presented in the Table 2. Items loaded on three factors that explained 62% of the variance. An appropriate collective label was given to each extracted factor so as to reflect the correlation of all the variables within. The factors comprised: Assembling Resources, Engaging Learners, Working & Building Confidence Together.

Assembling Resources	**Engaging Learners**	**Working & Building Confidence Together**
Q11.1 VET created opportuniti for me to talk to others about the industry or further study (People Rich)	Q12.1 My education from VET was valued at university	Q13.2 I received good support when I did work in groups of peers while in VET. *(Cohort-based)*
Q11.2 I was mentored throughout the VET programme *(People Rich*)	Q12.2 VET people encouraged me to undertake University *(Recognition of difference)*	Q13.3The other students in VET supported me well
Q 11.3 I was able to access funding support for my VET *(Financia Support)*	Q12.3 The VET programme prepare me well for University *(Enhance academic curriculum)*	Q14.1 I had access to sufficient resources and appropriate teaching material in VET (*Communication and information*)
Q 11.4 The VET programme I did was well known and had been running for a long time.	Q12.4 VET was interested in my preparation for University *(Researcl driven)*	Q14.2 There was good communication with the teachers in VET. (*Communication and information)*
	Q13.1 VET and university work wel together for students (Collaboration)	Q14.3 There was good communication with the other students in VET. *(Communication and information)*
		Q14.4 VET gave me practical experience which helped me understand the requirements of university (*Familiarisation*)

Figure 2 New model of effectiveness of pathways

First Component Factor – Assembling Resources

This factor accounts for the largest amount of total variance (44.1%). It encompasses four variables: Q11.1, Q11.2, Q11.3 and Q11.4. (See fig 2). The most important factor was 5.33 (Table 1) for Q11.4 *The VET programme I did was well known and had been running for a long time.* This suggests that the reputation and knowledge of the program is important and was considered one of the main reasons why students can navigate the pathways.

Second Component Factor – Engaging Learners

This factor accounts for the second largest amount of total variance (9.2%). It encompasses four variables: Q12.1, Q12.2, Q12.3, Q12.4. and Q13.1 (See Fig 2). The most important factor was 4.84 (Table 1) for Q12.3 *The VET programme prepared me well for University.* This component emphasizes that a human dimension is necessary to encourage student to feel that they are ready for higher education.

Third Component Factor – Working and Building Confidence Together

This factor accounts for the smallest amount of total variance (8.7%). It encompasses four variables: Q13.2, Q14.1, Q14.2, Q14.3 and Q14.4 (See fig 2). The most important factor was 5.52 (Table 1) for Q14.3 *There was good communication with the other students in VET*. This factor emphasizes the importance of good communication and information to enable access to pathways.

As previously mentioned the original DEMO matrix was created to measure the effectiveness of university outreach programs. The three-factor model (fig 2) is new and derived from the DEMO matrix. This new model is a contribution to the theory of pathways and is derived specifically for the articulation of students from VET to university.

The new 3-factor pathways model is a framework that can be used by universities and vocational education colleges to evaluate the likelihood that their pathways will be effective. If the proposed pathway programs do not have the necessary preconditions shown in the new matrix (Table 2), is unlikely to deliver a pipeline of students through to university. This research is significant in that it considers pathways as an organised and systematic process, which is capable of being defined and measured. The next section of the paper discusses the above findings and draws some conclusions.

Discussion

The study focuses on those policies and initiatives implemented in recent years designed to facilitate clear and easy pathways between vocational education and training (VET) and higher education. It also addresses barriers preventing learners from accessing these pathways and how learners perceive and make use of these pathways. This study indicates it is likely that a number of key characteristics must be present for a pathways model to be truly effective and sustainable over time. The results of this research confirmed that the factors could be described as: Assembling Resources, Engaging Learners, and Working & Building Confidence Together.

Gale et al (2010) indicates that Assembling Resources was important; this essentially meant navigating the pathways. It is complex for students who are not fully aware of the operation of the pathways. In addition, students may not be informed of the availability of articulation and credit transfer processes or RPL (Recognition of Prior Learning) and if that is the case, they may not seek credit transfer.

Students' learning journeys have been described as more like “stepping stones, zigzags or crooked paths” (Harris, Rainey & Sumner 2006). This was due to lack of information and guidance, lack of 'fit' between courses, and inexperience. This research supports the work of Harris et al (2006). Furthermore, when students are sufficiently well informed about pathways, they find their pathways and transition clearer. This has been described in this research as *Assembling Resources.*

The second factor has been identified as *Engaging Learners.* This component emphasizes that a human dimension is necessary to encourage students to feel that they are ready for higher education. Gale et al (2010) identified the importance of raising students' aspirations for higher education. The results of this research support Gale et al (2010) in that without sufficient support, students will not feel that they are prepared for the next level of education.

The third factor is *Working and Building Confidence Together*. This issue emphasizes the significance of support within the student cohort. The teaching in vocational colleges needs to help the building of confidence amongst students. The results of this research suggest that students need to feel confident that they are performing at a level that allows them to progress. It is not surprising that students that enter university based on their vocational education performance have had a positive experience of education. This is unlikely to be a chance event, instead this research supports the notion that pathways are successful when students *work* and *build confidence together.*

Conclusion

The objective of this research was to investigate the characteristics that have enabled higher education students to navigate the pathway to university degrees from vocational education. Whilst there is evidence that many pathways to higher education from vocational education do exist, it is clear that a number of key characteristics must be present for those pathways and the transition to university to be truly effective. In this paper, graduates from vocational education who gained access to higher education have been surveyed to determine the enabling factors. Their experiences have been evaluated to form a new pathways matrix. It is hoped that the model is a useful evaluative tool, which could be applied to further examine the effectiveness of pathways from vocational education to higher education and to develop new transition models based upon these enabling factors.

The contribution of this research is that these enabling factors need to be across issues such as; Assembling Resources, Engaging Learners, and Working & Building Confidence Together. This new model is a contribution to the theory of pathways and is created specifically for the articulation of students from VET to university. The model has been derived from the DEMO matrix; but in this research it reduces the number of categories to three (from 4) and slightly rearranges some of the individual criteria. However, it is clear that the essential characteristics of the DEMO model are retained. This research presents a new matrix that is a suitable proxy of the enablers of effective pathways from vocational education to higher education. What is evident is that a concerted action on a number of fronts, including an examination of the effectiveness of pathways models is urgent.

This paper confirms that in order for students to move from one form of tertiary education to another, it requires their aspirations to raised in a similar manner to what occurs in outreach programs. The result also demonstrates that the pathway is only likely to be effective if the right environment is created within vocational education that informs and builds confidence.

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Appendix

Survey questions that were derived from the DEMO matrix

Assembling Resources	**Engaging learners**	**Working together**	**Building confidence**
Q11.1 VET created opportunities for me to talk to others about the industry or further study (People Rich)	Q12.1 My education from VET was valued at university	Q13.1 VET and university work well together for students (Collaboration)	Q14.1 I had access to sufficient resources and appropriate teaching material in VET (*Communication and information*)
Q11.2 I was mentored throughout the VET programme *(People Rich*)	Q12.2 VET people encouraged me to undertake University *(Recognition of difference)*	Q13.2 I received good support when I did work in groups of peers while in VET. *(Cohort-based)*	Q14.2 There was good communication with the teachers in VET. (*Communication and information)*
Q 11.3 I was able to access funding support for my VET *(Financial Support)*	Q12.3 The VET programme prepared me well for University *(Enhance academic curriculum)*	Q13.3The other students in VET supported me well	Q14.3 There was good communication with the other students in VET. *(Communication and information)*
Q 11.4 The VET programme I did was well known and had been running for a long time.	Q12.4 VET was interested in my preparation for University *(Research driven)*		Q14.4 VET gave me practical experience which helped me understand the requirements of university (*Familiarisation*)
Q 11.5 When did you become aware of the university program that you are now enrolled? *(Early, long-term & sustained)*			