Using Narrative Research Findings as Student Voice for Providing Insights into Transition Experiences in Engineering Education

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SESSION
C3: Integration of teaching and research in the engineering training process

CONTEXT
This paper presents a study of students lived academic transition experiences of graduates from a Pathway program after they have transitioned into a Bachelor of Engineering (Honours) program. The importance of pathways for upskilling the workforce and bringing more people into Higher Education (HE) system that wouldn't normally have the opportunity from the traditional entry is essential to the continuous growth of the modern industrial economy. Narratives collected from the research to investigate students' academic transition experience provide an insight into this transition that cannot be captured by traditional quantitative or some qualitative approaches.

The narratives' findings are useful feedback information into academic transition programs and training. The outcomes of this study will be used to inform the education management and facilitate change in the provision of transition services to suit students transitioning from Pathway program into a Bachelor of Engineering (Honours).

PURPOSE
This paper presents narratives from the investigation of the students' academic transition in engineering education from Pathway program to Higher Education.

APPROACH
This paper describes participants' insights into their academic transition experience using the narratives collected from a Narrative analysis. Narratives describe the stories of the participants as a unique data source, and different to the traditional coding and categorising aspects typically used to produce a generalised or transferable description. In so doing, present the participant's account as unique and a whole story.

RESULTS
A total of twelve cases were investigated using in-depth narrative interviews from which four cases will be presented to demonstrate the insights into the academic transition experience during Pathway programs. These four narratives are used to contextualise the importance of using the participant's voice and stories as a useful source of feedback in engineering education research.

CONCLUSIONS
Narrative analysis offers a different way of collecting feedback and analysing the lived transition experiences of participants in engineering education research, it is particularly useful in cases where the voice of the participant is needed as a lens into particular phenomena and to provide a direct account of the participant.

KEYWORDS
Narrative Research, Qualitative Data Analysis, Pathway Transition Education

Introduction

The Council of Australian Governments (COAG) has set clear targets (Callan and Bowman, 2013; Bradley, Noonan, Nugent and Scales, 2008) for Australia to increase the percentage of the population entering Higher education. COAG indicated that by 2025, 40% of people aged 25 to 34 years should have a bachelor degree, up from 32% in 2008. One important approach to achieve COAG target is to improve access to Higher Education Bachelor Degrees by creating an improved post-secondary school pathways education for Vocational education graduates to gain entry into the Bachelor degree programs (Callan and Bowman, 2013; Burke and Shah, 2006; Access Economics, 2009). The importance of this target provides the need to adequately understand the academic transition the articulating students are experiencing from Pathway education to Higher education.

This paper presents the findings from a study of students lived academic transition experiences from a Pathway program into a Bachelor of Engineering (Honours) program. Narratives collected from this research provide an insight into this transition experience and a useful feedback into the development of Pathway education programs. Also, the outcomes of this study inform the education community and facilitate change in the provision of transition services.

Context and Method

The motivation for undertaking this study was based on the importance of pathways for upskilling the workforce and bringing more people into the Higher Education (HE) system that wouldn't normally have the admission opportunity from the traditional entry requirement. This is essential to the continuous growth of the modern industrial economy.

The Pathway education pedagogy represents innovation in education and training. This is the process of finding a new, an innovative method of delivering education system from the curriculum of established current education systems or practices. As an example, in Australia, at Swinburne University of Technology (SUT), first-year units from the Bachelor Degree of Engineering (Honours) were used to set up a curriculum to deliver the same units as part of an Associate Degree in Engineering. The Associate Degree is then delivered with more flexibility and allow a variety of admission entry requirements. This method of providing foundation units of Bachelor Degree allows the graduate of Associate Degree of Engineering to achieve two objectives. Namely, to gain significant credit towards a Bachelor degree program, if there is a desire to follow pathway system, and provides solid preparation for a vocational career in engineering industries as an Associate Engineer if there is a desire to exit study and get a job. However, little is known about the experiences of students taking these units in an associate degree and their subsequent pathway experiences into higher education.

Data Collection Approach

"The main claim for the use of narrative in educational research is that humans are storytelling organisms who, individually and socially, lead storied lives. The study of narrative, therefore, is the study of the ways humans experience the world." (Connelly & Clandinin, 1990, p. 2).

Higbee, Arendale, and Lundell (2005, p12) call for more qualitative research in their recommendations, arguing that it is possible to know quantitatively how a student is performing in a course based using quantitative measures such as assessment marks, grade point average, and other achievement markers. But Interviews, focus groups and classroom observations provide information about students' perceptions of their educational experiences that cannot be captured through the traditional quantitative measures. The graduates of the Associate Degree of Engineering have so much more to tell us regarding their academic transition into the Bachelor Degree (Honours).

In this study, the first set of participants (total of 6 cases) were invited to attend a first round of an in-depth interview to collect data for a narrative analysis. Narrative analysis of the transcript of the in-depth interview data for the first set of the participants was performed, and it led to a conclusion to invite a second set of participants (total of 6 cases) for another first round of an in-depth interview to increase the data set. Narrative analysis of the transcripts of the interview data for the second set of participants was performed, and the outcomes of the analysis indicated that fifty percent of all the participants need to be interviewed the second time for longitudinal information and to authenticate the narrative co-constructed from the first interview. This process provided an opportunity for the validation of the co-constructed narratives for all the first round of interviews analysis.

Four cases from the total of twelve in the major research are presented in this paper. The majority of the participants in this research have common characteristics that gave a reason to why they have chosen to do an Associate Degree in Engineering. These characteristics were (a) They enrolled into the Associate Degree to get into the Bachelor Degree of Engineering or Science study at university, (b) They obtained lower than expected Bachelor Degree entrance requirement score and (c) they had not taken the year twelve Mathematics Method unit as a prerequisite for the bachelor. Table 1 provides the data collection summary of the four cases presented in this paper.

Table 1: Data Collection Summary

2015 AD Graduates Case Name	**2016 Enrolment**	**1st Interview**	**2nd Interview**
Chris	Civil Engineering	July 2016	Oct 2016
Bobby	Robotics and Mechatronics Engineering	Oct 2016	
2014 AD Graduates Case Name	**2015 Enrolment**	**1st Interview**	**2nd Interview**
Caroline	Mechanical Engineering	Aug 2015	May 2016
Sofia	Civil Engineering	Sept 2015	Nov 2016

Outcomes of the narrative analysis

The narrative analysis method used for the collected data was described in an accompanying paper (Alao, Mann & Bryant, 2016). Where Polkinghorne criteria (Polkinghorne 1995) were used to create a setting with depth, temporal continuity using an order that easily connects the reader to the story and Mauthner & Doucet's "voice-centred" method (Mauthner & Doucet, 1998) was used as an analytic approach to the interpretation of the transcript data. This paper focuses on the findings of this analysis, and these outcomes are presented below.

Four cases were selected for presentation from the twelve investigated to demonstrate the importance of providing an individual voice to transitioning students. Any of the other twelve cases for this paper could have been selected; the four selected provide some common story plot among all the twelve cases and some individual uniqueness.

The narratives from these cases demonstrated the usefulness and reason why the Narrative inquiry method was important for our research. The personal account given by the participants and co-constructed by the research analysis could not have been possible without using a methodology that allows empathy during the data collection process.

It is equally important to know that these narratives are evidence to make a case for change. A change to either ensure that most students' lived transition experience stories indicates an improvement in their academic transition or a change to make sure that certain transition current practices do not continue. The following are some key extracts from the narrative analysis of the research data for the four selected cases:

Case One Extracts – Caroline Engineering Challenge

Caroline was not sure whether she could cope with doing engineering, but she has a desire to become an engineer. She found the transition from high school into the Associate Degree a big challenge. However, she was successful and graduated to articulate into the Bachelor Degree.

Extract 1.

Immediately she started the Associate Degree, she realised the academic challenge ahead doing engineering at a university, Caroline said, the *"first two weeks I didn't think that I could do engineering and so I was having a bit of a meltdown to my mom. I can't-do this; I'm dropping out".* Caroline's mom encouraged her to continue. Then she said, "*Look at me now. So, it's good that I stayed, but that was hard to transition from high school to university."*

Extract 2.

Caroline said "*It was good having one, we did Fluid Mechanics while still in the Associate Degree. That was good having rather than being straight away thrown into a real university kind of set up. Having that one to ease into it was helpful".* Doing transition unit in the second year of the Associate Degree was a positive experience for Caroline. She said it "*Just gave us a feel of what was going to be like in the Bachelor Degree and so it's a lot easier I reckon to have that extra Fluid Mechanics that we did to ease us into a different way of learning"* in the Bachelor Degree.

Extract 3.

Caroline was happy and grateful for a good preparation received from the Associate Degree; She said "*I found in the Associate Degree I learned with people in groups, and I'm more of a solitary learner at the moment. I enjoy going through it by myself, and I learn it better by myself at the moment than I did with other people, but I think that's because I've built up that knowledge in the Associate Degree".* She was ready for the "*massive lectures with 200 plus people".* Now in a good position to deal with a new learning environment where "*It's harder to make friends. People that you do assignments with and work with in a big lecture theatre you don't see those more than once or twice in the semester because you're not sitting next to the same people every day".*

Case Two Extracts – Sofia Engineering Adventure

Sofia was an international student with Australian born mother. She was certain about becoming an engineer and selected civil discipline even before gaining admission into the Associate Degree. This has a uniqueness of strong goal setting. Sofia was undeterred by all challenges she came across, and she completed the Associate Degree then transited into the Bachelor Degree.

Extract 1.

Sofia started her engineering adventure story in Cyprus in 2013. She started her story by saying, *"I'm originally from Cyprus, but my mum was born here, so I've got an Australian passport, so I'm an Australian citizen, and so I always wanted to come to Australia to study".* She wanted to do a Bachelor Degree in Engineering, but the entrance requirement meant she would not be able to gain direct admission into the Bachelor Degree program in Australia. She said, *"I finished high school, I didn't complete my IL program for English, and to get into the bachelor I had to complete that for one year, so I applied for the Associate Degree which gave me the opportunity to come here and start from that and then go into the Bachelor Degree. So I am really happy that I did that".* Sofia used this reason as the basis for chosen Associate Degree as her pathway into the Bachelor Degree and said, "*I would miss a year of my life doing nothing if I did not get admission into the Associate Degree".*

Extract 2.

She was very happy with her Associate Degree transition experience, she said*, "I will stand by my experience in the Associate Degree. So what I realised now is that I learnt the same thing as I would learn in the Bachelor Degree but in an easier way. And so I didn't miss out on anything so I don't feel I have something that would keep me back from understanding better in the Bachelor Degree",* this was assurance that she was well prepared for her transition into the Bachelor Degree. And finally, Sofia said, "*Now I have applied for the Bachelor Degree I got in from the Associate Degree there was no problem with that, so we got accepted straight away, and now my marks are really good, and I am trying so hard, and I am enjoying it".*

Case Three Extracts – Chris Big Engineering Transition

Chris was indecisive on what to do after high school. He was lucky to have a well-informed career teacher at high school, who suggested the Associate Degree of Engineering as a career path to Chris. It was difficult at the start for Chris due to the change of learning environment and getting used to a new colleague but he was happy with the decision, he successfully graduated and transferred into the Bachelor Degree.

Extract 1.

According to Chris, "*Our careers teacher at high school had a positive experience with students in previous years of the Associate Degree. He suggested to some students to do the course, and I think he must have spoken to the kids who have done it, and he said, "Look I think this is a good path for you guys to take. Maybe weren't quite ready to jump straight into the Bachelor with just our study habits, we were not quite as focused as we needed to be at that time to do the Bachelor. But the Associate Degree was an opportunity to not completely write off university and give us a chance, a stepping stone to ease us into the university experience. And so he said, "Look, guys, I think this is a good opportunity for you guys, it's attainable," because we weren't studying as hard as we needed to, to get straight into the Bachelor. We need to get 85 or more to get straight in. And he said, "I think you should consider this Swinburne's Associate Degree, it is especially good for pathways to the Bachelor."* Chris took the advice of his career teacher and applied for the Associate Degree course. He was admitted and started the first year. Chris said, *"The first year was good, there was a lot of support obviously, and it was more of a school environment as opposed to just enormous lecture theatres".*

Extract 2.

The Associate Degree was well suited for Chris due to the flexible learning environment provided for the delivery of the program. As Chris said, "*we have smaller classes, much more one-on-one time with teachers and they were a lot of communications. You guys were always there to talk to us, and we come to your office and ask questions and pester you all the time. So, it was good and so the first year was good".* Naturally expected, Chris was very worried in the semester one of the course, new environment, new mates and course. He said, *"I was a bit nervous at the start, in semester one, but then we had all the help from the teachers, and I did alright. In the second semester, I got a bit complacent, I thought and ended up failing a unit. But that was completely my fault, that wasn't anything to do with lack of resources or anything, it was just the fear from the first semester had worn off, and I thought, oh this is not bad, I've got this but then came back to bite me. And then, so first semester of the second year was similar it was good, I realised I've got to get my act together, and again that was a good semester I think I enjoyed the subjects".*

Case Four Extracts – Bobby Engineering Project Education

Bobby academic transition is about change. He was very particular about the effect of change of environment, the change of learning style from the Associate Degree to the Bachelor Degree. The expected level of responsibility was challenging for Bobby, but he was successful in his transition into the Bachelor Degree program.

Extract 1.

According to Bobby, the biggest part of his engineering adventure was the transition between the Associate Degree and the Bachelor. He said, "*Ok well there's kind of few different components to it, the biggest transition point for me, is the change of environment, the change of learning style. Alright, obviously, they come in the form of lecture, tuts and lab. They are different between the Associate Degree and the Bachelor".* He was very keen to give his comparison account between the two environments. He said, "*Ok, so the Associate Degree was obviously a very classroom oriented environment most of our day was spent in a classroom with the same teacher and the same group of people every day, and you got to know everyone which is a bit different to the Bachelor".* According to Bobby in the Bachelor degree, everyone was business-like and focused on the purpose why they are in the University. He said, *"Everybody's a bit more business oriented, you don't get to know everyone it was close-knit, and people don't get to know each other. That's a big transition, a big difference. And that also means that the material is delivered differently".* Bobby felt you know you are in Bachelor because "*you get lecture explain to you and you go to tut and get showing how to do questions, and then you go away, and you study the material on your own. Whereas in the Associate Degree, you get all of that in the one setting; In one class, you have the material explained to you, the questions explained, and then you get an opportunity to do it yourself with a supervisor and to correct you if you make any mistakes, which I think is a really good thing about the Associate Degree. It is quite reminiscent of high school".* Bobby was appreciative of the Associate Degree learning environment and said: "*It's difficult to say because the classroom environment that I was describing before is really helpful and I found it easier to get better marks".*

Extract 2.

Bachelor Degree expected more responsibility from the students beyond what was offered in the transition elective because students are expected to make a decision on their subjects' choices and do a self-allocation into teaching activities. This responsibility was challenging for Bobby. He said, "*And then when you get to the Bachelor, you end up having to pick and choose the subjects that you do by yourself. And that was something that was a little bit awkward I think, I didn't know what subjects were going to be important and which ones I should do first and that kind of thing; I didn't know a lot about the course moving into it".* A transition course adviser would have been helpful to explain and assist the graduate of the Associate Degree articulating into the Bachelor. According to Bobby, "*Well When I was choosing my subjects I wasn't sure how the system worked and so what I did was called the Student help desk. I asked them to explain what to do, but they were very casual about it, they were kind of if you can do it just sign up for it if the prerequisite is not there then don't do it. It's like ok sure, and I had a looked at the unit outline that described the subject. And even from that, it's hard to tell what's going to be good what's going to be bad. In retrospective, it probably would have been being good to come in and maybe talk to somebody who was a course adviser or something like that I would have been pretty beneficial, and I might have avoided that situation".*

Findings & Discussion

The findings from this research are useful feedback information into the academic transition of the graduates of the Associate Degree. The following are the findings from the four cases presented in this paper. Some of these findings are described as follows.

Caroline: Key findings from the narrative

1. Doubt of their ability to do engineering study.
2. Encouragement from family stopped them dropping out of Associate Degree.
3. Doing Fluid Mechanics as a transition unit (from the Bachelor) was a positive academic transition practice.

4. Associate Degree provided good preparation for transition into the Bachelor through a built up of good foundation knowledge.
5. Hard to make friends and form learning group in the Bachelor program.

Sofia: Key findings from the narrative

1. Admission flexibility (skip one year of IL English course) as the basis for chosen Associate Degree as a pathway into the Bachelor Degree.
2. Learnt the same foundation units as in the Bachelor Degree but in an easier way.
3. Associate Degree offered good transition preparation for the Bachelor- I didn't miss out on anything, so I don't feel I have something that would keep me back from understanding better in the Bachelor Degree

Chris: Key findings from the narrative

1. Career teacher suggested Associate Degree as a pathway into the Bachelor- Our careers teacher at high school had a positive experience with students in previous years of the Associate Degree
2. High VCE score as admission requirement into the Bachelor was one of the reasons for choosing to do the Associate Degree.
3. In the Associate Degree, the first year was good, there was a lot of support, and it was more of a high school environment as opposed to just enormous lecture theatres.
4. Nervous at the start, in semester one of the first year, but then he had all the help from the teachers, and did alright.

Bobby: Key findings from the narrative

1. The biggest transition point for Bobby, was the change of environment, the change of learning style from the Associate Degree to the Bachelor Degree.
2. Everybody's a bit more business oriented, you don't get to know everyone it was close-knit, and people don't get to know each other. That's a big transition, a big difference.
3. The learning material is delivered differently between the two programs. Associate Degree delivery is quite reminiscent of high school.
4. In Bachelor, you end up having to pick and choose the subjects that you do by yourself. And that was something that was a little bit awkward and challenging.
5. It would have been being good to come in and maybe talk to somebody who was a course adviser.

The following discussion of the above findings provides a case for change that is supported by the evidence from the narratives from the voices of the participants.

The academic transition provided in the Associate Degree program where the Associate Degree students are required to select a one-unit elective from the Bachelor Degree program was a good transition service provided by the university. The Associate Degree graduates considered this as important for their academic transition. In the four cases presented above, these participants did either Fluid Mechanics or Programming for their transition elective. They claimed that it was useful for their transition. Further research is required to find out if doing more than one elective unit would be beneficial to the transition of the Associate Degree students or not.

The Associate Degree graduates highly rated the supportive environment provided by the program. In this study, the participants cited the peer-to-peer support from their colleagues and a small student's classroom size assisted their success in the program. The open access and support from the Associate Degree teachers were invaluable to the students of the program.

There was a call for a course specialist adviser that understand both the vocational education and higher education environments to provide initial transition interview with graduates of Associate Degree articulating into the Bachelor Degree student and advise on study plan and timetable issues.

The students are expected to develop their own ability to navigate their transition after graduation from the Pathway program and plan their units' selection and learning strategies using the resources and information provided by the university. This was considered as important to the students self-depend and development in a university.

We can argue the need for the following changes from the above discussion. These changes would significantly improve the transition experience of the graduates from the Associate Degree articulating into the Bachelor Degree:

The graduates of the Associate Degree agreed upon the importance of doing transition unit as part of the Associate Degree program as a preparation for the Bachelor Degree learning environment. This is a positive transition experience gained by these graduates, and this initiative should be expanded to allow the students to do more than one Bachelor Degree unit as electives during the second year of their Associate Degree program.

An introduction of a course adviser specialist to talk to the articulating students through their transition study plan for the Bachelor and timetable requirements. This may require an academic with an experience in the vocational and higher education teaching environment to assist the professional staff to conduct a pre-enrolment interview during the orientation period.

Goal setting is a primary tool required by students in any pedagogic education environment. It is argued that the art of goal setting is a skill that should be taught in Higher education to the transition students from developmental pathway education. The graduates of Associate Degree are coming from the VET environment where the teachers are performing the task of goal setting and planning their learning strategies for them. Further study needs to be done to gather evidence on what support is available to the transition students, to assist them in developing their skills in learning strategy planning, since this is the key to their academic success in the higher education environment as suggested in Dowling, D. (2010) & Australian Workforce Productivity Agency (2012) report.

Conclusions

Narratives from the Narrative analysis offers a different way of collecting feedback and analysing the lived transition experiences of participants in engineering education research, it is useful in cases where the voice of the participant is needed as a lens into particular phenomena and to provide a direct account of the participant.

The findings of this research of the Associate Degree graduates telling their lived academic transition experience would be used to argue for changes to the transition services provided for these graduates moving to the Bachelor Degree programs and to inform the engineering education community on the provision of transition services requirements coming from the voices of these graduates in Australia.

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