

Effect of Pedagogy Differences for Vocational Education Graduates transitioning to Higher Education Bachelor Degrees.

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THE LIVED EXPERIENCES OF ENGINEERING STUDENTS IN THEIR ACADEMIC TRANSITION FROM VOCATIONAL TO HIGHER EDUCATION: A NARRATIVE INQUIRY AND USING SCHLOSSBERG'S TRANSITION THEORY.

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Abstract

Current research indicates that military veterans, students with a low high school score completion certificate, women and under-represented minorities are grossly disadvantaged in career advancement or career change prospects using the higher education bachelor degree as an academic transition phase into becoming a professional engineer. In Australian education systems, the Vocational education systems have several post-secondary qualifications used as a developmental education to gain access to a higher education degree program for low-social economic groups or with people that do not meet the direct entry requirements. Research in this paper narrates how these groups have navigated their journey through meeting the challenge of the academic transition education in the vocational education system, gained access to the higher education bachelor degree in engineering and achieved their dream of becoming a professional engineer for their new career. Narratives outcomes from the investigation of the students' academic transition lived-experiences provide an insight into their transition experiences that cannot be captured by traditional quantitative or some qualitative approaches. These narratives are used as feedback information into the academic transition programs and training. The outcomes of this study are used to inform the institutions on the possible changes in the provision of transition services to suit students transitioning from vocational to higher education in engineering programs.

Introduction

"People shape their daily lives by stories of who they and others are and as they interpret their past in terms of these stories. Story, in the current idiom, is a portal through which a person enters the world and by which, their experience of the world is interpreted and made personally meaningful. Narrative inquiry, the study of experience as a story, then, is first and foremost, a way of thinking about the experience. Narrative inquiry as a methodology entails a view of the phenomenon. To use narrative inquiry methodology is to adopt a particular view of experience as a phenomenon under study" (Connelly and Clandinin, [2]).

Narrative analysis is a way of understanding and inquiring into participant's experience through a collaboration between the researcher and participants, over time, in a place or series of places, and social interaction with the environment (Clandinin and Connelly, [1]). It has particular power and insight in highlighting the voices of marginalised and minority groups in engineering education research. This group would include women, LGTBIQ and indigenous people (Pawley and Phillips, [6]).

This paper presents the outcome of the effect of the pedagogy differences for vocational education graduates transitioning to higher education. It uses the study outcomes of a narrative analysis of the investigation of students' academic transition lived-experiences in engineering education articulating from Vocational education to Higher education Bachelor degree programs in Australia.

The paper describes participants' insights into the academic transition lived-experiences using the narratives collected from a narrative analysis, and Schlossberg's transition theory (Anderson et al., [5]) was used to explain the result findings. The narratives are the findings from the narrative analysis. It explores the stories of the participants as a unique data source, and it replaces the coding and categorising methods typically used to produce a generalised or transferable description in some engineering education research. Narratives findings present the participant's accounts as unique and as a whole story, see research studies [3], [4], instead of theme categories.

Defending a career in engineering

For an academic engineering director, collecting student's personal experience stories and reflection is the pinnacle of raw data narrative data required for research investigation. One of these unique stories came from one of the Australian veterans. Here is Lane's story, one of the personal accounts that we currently use to encourage voices of marginalised and minority groups to tell their academic story and to encourage others to do engineering. In engineering education research, this would include women, LGTBIQ and indigenous people to explore alternative career by becoming a professional engineer. Here is Lane's narrative through the eye of the narrator. During service in the Australian army, Lane worked as a construction pioneer, helping build infrastructure for a local community in East Timor. It was here that he matured his life-long interest in Engineering. Now studying

an Associate Degree of Engineering at Swinburne, Lane hopes to create new and innovative capabilities for servicemen and women in the defence industry.

For Lane’s Case, his eight-year service in the Australian army was one of the main motivations for deciding to study engineering at Swinburne. It was during this time that Lane matured his passion for engineering and his desire to help developing nations. “I was deployed three times to East Timor for peacemaking and peacekeeping operations,” says Lane. “During my time there in 2002, I was a Construction Pioneer, working with the local population to build and construct bridges, roads and much-needed infrastructure.”

A new course of action: When injuries started to get the better of him, Lane decided to further his interest in engineering by taking up an Associate Degree of Engineering at Swinburne. “Not wanting to be sitting around complaining, I decided it was time to take my hobby of playing with electronics and programming to the next level and learn more about it and use it as a career.” Although not having completed high school, a pathways course at Swinburne seemed to be the perfect way to get his foot in the door – allowing him to transition into a tertiary degree on completion (2018, Swinburne). All the participants in this study shared their personal account as a minority group that needs access to a higher education Bachelor degree for a career change.

Case Study Context

Table 1.1 shows how different organisations and countries around the world give vocational education (VE) or vocational education and training (VET) different pedagogy names.

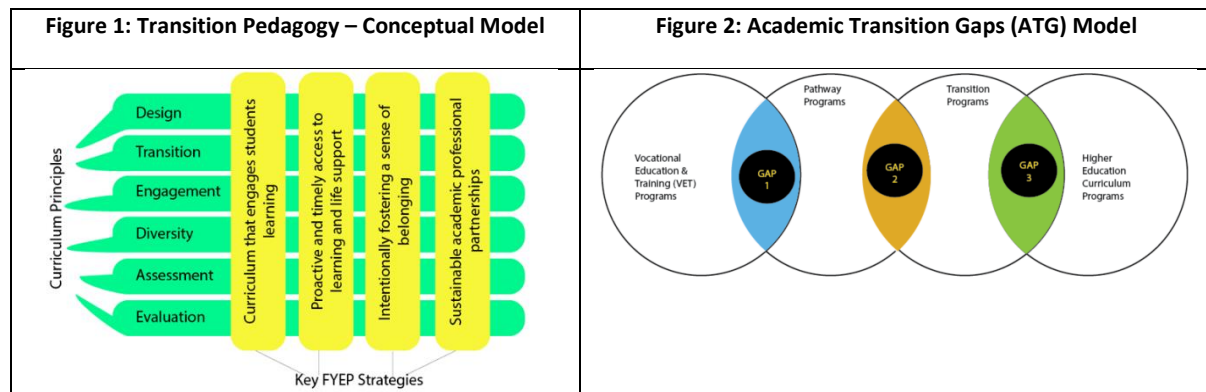
Country / World Organisation	Various names around the world	Region
UNESCO & EU	Technical and Vocational Education and Training (TVET)	European and united nations
Australia & Asia-Pacific	Technical and Further Education (TAFE) Vocational and Technical Education (VTE) Vocational Education and Training (VET) Vocational Education (VE)	Australasian
United Kingdom	Further Education (FE)	England
USA	Career and Technical Education (CTE)	United State of America

Note: UNESCO (United Nations Educational, Scientific and Cultural Organization)

Table 1.2 shows the comparison of the USA and Australia school education categorisation. This comparison is essential to take the international readers along and gain the understanding that voices of marginalised and minority groups in engineering education research that include women, LGTBIQ and indigenous people are the same and it is beyond country boundaries. The question and challenge are how we can manage the pedagogies differences between the post-high school education systems (or the college systems) and the bachelor degree education system around the world to benefit the minority groups? This question represents the key issue for the context of this paper.

THE UNITED STATES OF AMERICA			AUSTRALIA (STATES & NORTHERN TERRITORY)		
Grade		Age	Grade		Age
4	COLLEGE	21		University Degree (HE)	22
3		20		Associate Degree (HE)	21
2		19		Diploma & Advanced Diploma (VET/HE)	20
1		18		Certificate 1 to IV (VET)	19
	High school diploma	18			
12	SAT tests HIGH SCHOOL (Grade 9-12)	17	12	SENIOR HIGH SCHOOL (Grade 11-12)	18
11		16	11		17
10		15	10		16
9		14	9	JUNIOR HIGH SCHOOL (Grade 7-10)	15
8	JUNIOR HIGH SCHOOL (Grade 6-8)	13	8		14
7		12	7		13
6		11	6		12
5	ELEMENTARY SCHOOL (Grade 1-8)	10	5	PRIMARY SCHOOL (Grade 1-6)	11
4		9	4		10
3		8	3		9
2		7	2		8
1		6	1		7
		5	0		6
	KINDERGARTEN	4		Pre-Primary School	6
				KINDERGARTEN (Year 4-5) & Childcare (Year 1-3)	5
					4

The Transition pedagogy, shown in Figure 1, for an optimal First-year education (FYE), a good first-year curriculum design should follow the six FYE curriculum principles that are interconnected by four key First-Year Experience Program (FYEP) strategies based on Kift et al. [8], namely (1) Curriculum that engages students learning, (2) Proactive and timely access to learning and life support, (3) Intentionally fostering a sense of belonging and (4) Sustainable academic-professional partnerships. If the FYE curriculum designer follows these principles, it will facilitate all students fully achieving their desired learning outcomes. In this study, these principles are particularly important since the participants of this study spend two years in a developmental education program. That is an Associate degree of engineering in the Vocational education and training (VET) environment and articulated into the Bachelor degree of engineering in higher education.



The Academic Transition Gaps (ATG) Model ATG model in Figure 2 is based on the Australian education systems. Other countries may have different education scaffolding systems that may require this model to be modified for additional studies. In the model, Gap 1 represents a community of practice where the trade (Certificate one to Certificate four apprenticeship qualifications) and diploma students are encouraged to pursue para-professional education. Gap-2 is the community of practice where the Diploma and Advanced Diploma students are encouraged to complete additional pathway study. Gap 3 is the community of practice where Associate degree students are encouraged to do some university electives as preparation for transition to Higher Education environment. This model development raises the following research questions for investigations: What are the pedagogies differences

1. between vocational education programs and pathways programs where Gap-1 existed,
2. between pathway programs and transition programs where Gap-2 existed, and
3. between transition programs and higher education programs where Gap-3 existed?

It is important to note that Zukas and Malcolm [9] identified five pedagogies identities in their review of literature on pedagogy in higher education,

1. The educator as a critical practitioner
2. The educator as psycho-diagnostician and facilitator of learning
3. The educator as a reflective practitioner
4. The educator as a situated learner within a community of practice
5. The educator as assurer of organisational quality and efficiency; deliverer of service to agreed or imposed standards

This study uses Schlossberg's transition theory (Anderson et al., [5]) as the theoretical lens to view and explains the data analysis findings. Schlossberg's transition theory conceptualised adult development from the transition perspective where the transition is considered life events or non-events, resulting in changed relationships, routines, assumptions, and roles. A transition is a transition only if it is defined by the person experiencing it. Anderson et al. (2012, p. 3) claim that "a central theme in our current social context is the change". We will all experience change at certain points in our development. This period of change is the transition stage. They describe that in any transition, there is the first stage called moving-in, the second stage, moving-through and the final and third stage, moving-out. When an individual moves into a new situation, whether a new job or an educational environment, the person needs to become familiar with new rules, regulations and expectations, this is considered moving-in. Once familiarisation is established, the transition is then considered to be in the moving-through the stage, where the person going through the transition needs to balance the new activities with the rest

of their lives. This stage may be a long transition, and the learner may need help to sustain this period. Then comes, the moving-out time; this is the end series and the person going through the transition may ask, what comes next? Most people understand the moving-in and moving-out stages; it is the Moving-through that can sometimes be hard to comprehend fully. Anderson et al., [5] describe this time as one of groping for new roles, relationships, routines, and assumptions; a neutral zone or period of emptiness and confusion; a cycle of renewal; and a time of hope and spirituality. According to Schlossberg, this is the time when one is either revitalising one's situation or getting bored with it. A student going through an education environment transition, like going from Vocational to Higher education, will have multiple stages of transitions. The level of support available for the transition will ultimately determine how well the adult copes with transitions. This level of support is particularly essential for the insight when we are listening to the voices of marginalised and minority groups in engineering education research. This group would include women, LGTBIQ and indigenous people.

Method

A total of twelve cases were investigated using narrative in-depth-interviews from which one case is presented in this paper to demonstrate the insights into the effect of pedagogy differences experienced during transitioning from vocational to higher education. These narratives are used to contextualise the importance of using the participant's voice as a useful source of feedback in engineering education research and to gain the understanding that voices of marginalised and minority groups such as women, LGTBIQ and indigenous people are essential to the development of the modern economy. The research method used in the narrative analysis in this paper is peer-reviewed in [3] and [4] research.

Results and Discussion

The finding of this study shows a necessary implication that is sometimes overlooked regarding pedagogies differences in academic transition. What is the dynamic relationship between educators and learners in higher education settings? If we accept that the classroom, lecture theatre and the laboratory are workplaces for the community of practice for a lifelong learning irrespective of the engineering disciplines in practice. This question conceptualised pedagogies identities. What are the pedagogies identities of an educator that affects life-long learners learning? This question is vital to a learner that aspires to become a professional engineer. The influence and interaction of the educators could decide what disciplines of engineering a learner, in particular, the college students in minority group would choose for their engineering profession. Although the scope of this study does not cover these questions, these questions would be a further research recommendation coming out of this study.

All the participants recruited for this study were undergraduate engineering students that graduated from the Associate degree of engineering and gained admission into a Bachelor degree of engineering (honours) after their first three months or more in the degree courses. All the participants belong to a minority demographic groups low self-esteem about doing university degree when they first enrolled in the Associate degree of engineering and since moved on to do the Bachelor degree of engineering after graduation from the Associate. Each participant in the twelve cases told and shared his or her story in an interview lasting approximately thirty minutes. The participant's names were pseudonymised since the study did not have their permission to use their real names in the research. The following is a brief introduction to the personal account of each participants' background.

Stallion

Stallion is a second-generation Australian Italian with long curly black hair. He has a permanent smile with a comedian looks about him. Everyone wondered about Stallion's gender orientation. Stallion- was fresh out of high school when he joined the Associate degree course in 2011. He always wanted to entertain others. Stallion explained he started an Associate degree course to do the Bachelor degree and used it to replace his entertainment part-time job when he finished the Bachelor degree course. He transitioned into the Bachelor degree course after finishing the Associate degree. Stallion thought the Associate degree course was a great way to transition from high school into university. "It was all about adaptability proudly", said by Stallion. Stallion explained that the Associate degree was a good course for the transition from year twelve into university. He said that making friends and getting initiated into university was the most critical moment for his engineering academic transition experiences.

Sofia

Sofia started her engineering adventure story in Cyprus in 2013. She has an Australian-born mother and a Greek-born father, both parents, now permanently, living in Cyprus. Sofia's mother spoke highly about the Australian education standard and encouraged her to study in Australia after her secondary schooling in Cyprus. Sofia wanted

to do a Bachelor degree in engineering. However, the entrance requirement said she would not be able to gain direct admission into the Bachelor degree program in Australia, so she sought a pathway as an alternative option. Sofia explained, "I was unable to speak English in Cyprus", and Sofia planned to travel alone to Australia with no parent or guardian. However, she was determined to become a professional engineer in her mother's birthplace. Sofia always wanted to come to Australia to study once she finished high school to study civil engineering. However, the admission requirement for the course required Sofia to complete program for English. This action would take one year to complete before getting into the Bachelor degree program. Instead of following this course of action, she applied for the Associate degree since she met the English language requirement for the Associate degree program. Sofia explained that she was thrilled to follow this pathway opportunity offered from the Associate degree course.

Caroline

Caroline's engineering academic transition story started with the word "my introduction to engineering". She enrolled in the Associate degree in engineering in 2013 knowing that she did not do year twelve mathematics and physics. She described herself as bold and courageous to make this decision at the time. Caroline explained that she was one of two females that enrolled in the course in that year. Caroline wanted to do a Bachelor degree in engineering, but there are two major obstacles in her way. She explained that she was afraid of failure in a university environment setting, and she had a low high-school final exam score. So, Caroline investigated the concept of the pathway in a dual-sector university and discovered the Associate degree in engineering course as the best pathway option to address the two major obstacles in her goal of becoming a professional engineer.

Jackson

Jackson started his conversation by declaring that he is a mature age student, with low self-esteem, and he would like to have had academic support for his long absence from studying. Jackson's reason for selecting to do the Vocational Education based Associate degree was a pathway opportunity into the Bachelor degree course. He was a mature age student coming out of a trade, and he wanted to refresh his knowledge and skills of relevant subjects for engineering study. Jackson explained that the reason for selecting the Associate degree course was because it had been about four to five years since he finished his year twelve education. Jackson completed his Associate degree and Bachelor.

Lucky

Lucky has a passion for mechanical trade, but he wanted to become an engineer. He was torn between becoming a trade technician and becoming an engineer. Lucky explained that all through high school; he did not want to be at high school, he did not enjoy high school. He ended up starting to do an apprenticeship; He did that through four years of high school education. Lucky explained that a teacher pulled him aside one day and said, "Look, you really can do the work, you should finish; you just need to pull your finger out and give it a good crack." So, Lucky decided to give it a good shot, and he ended up finishing high school while completing a certificate for his apprenticeship at the same time. Lucky was very proud to complete high school, but he got a low high-school final exam score, and it was decision time again to decide what to do next. Lucky was doubtful of whether he could complete four years of a Bachelor degree course so, he decided to do an Associate degree for two years to see what it is like to progress through that before doing a Bachelor degree course. If he did not like the Associate degree course, he could leave. So, in 2011, lucky was admitted into the Associate degree and enrolled. He completed the Associate degree and moved on to do the Bachelor.

John

John came straight out of high school into the Associate degree course. He joined the Associate degree in 2003, and he titled his engineering academic transition story as "Engineering my Future". John mentioned that the Associate degree course provided an avenue for people like himself with a low high-school final exam score to gain entry into a university course and a chance to do a Bachelor degree course after completion.

Brown

Brown was not creative when it came to telling a story. He explained that he was not the most creative person, but he was happy to tell his engineering academic transition story. He joined the Associate degree course because he did not meet the mathematics required to gain direct admission into the Bachelor degree. Brown did not do maths methods in high school; the Associate degree course provided an excellent opportunity to build up his mathematics skill. According to Brown, the course provided an Engineering Foundation Mathematics to build up the missing skill that would have been gained by doing Math Methods in high school.

Landau

Landau wanted to do the Bachelor degree course immediately finishing high school, but he did not meet the mathematics requirement for direct entry into the Bachelor of Engineering course. He did not do maths methods in year twelve of his secondary schooling, so he decided to do the Associate degree. Jackson explained that without doing the Associate degree first, he would have failed a lot of the units in the first year of Bachelor degree if he had not have done them in the Associate degree. Landau knew that mathematics subjects in the Associate degree course were challenging but important for success in the Bachelor degree course.

Chris

Chris discovered the Associate degree course through a conversation with his career's adviser at the high school, who suggested the course as an effective pathway into the Bachelor degree engineering course. Chris mentioned that their high school career officer had positive feedback about the course and said to Chris to use the Associate degree as a stepping-stone into university. Chris took the advice of his career-teacher and applied for the Associate degree course

Lassy

Lassy was not sure which discipline of engineering; he would like to do at the start. He knew that Swinburne has a variety of Bachelor degree courses in engineering, so he chose an Associate degree in Engineering that is not discipline-specific, and after completion, he could then select which Bachelor degree discipline to do. He decided to do the Associate degree instead to have more time to decide on his prefer engineering discipline.

Tony

Tony completed an electrical apprenticeship and worked in the industry for sometimes. He also worked in the hospitality industry before deciding to do further study. Tony was a mature age student. He had not done an academic education for a long time, although during high school, he had done maths methods. However, this was a long time ago. Tony was unsure how long he could commit to a university study to become a professional engineer. He was, however, willing to try. Two years of the Associate degree course fitted perfectly into Tony's timeframe to try as compared to four years of a Bachelor degree course.

Bobby

Bobby started his account of his academic transition by saying straight out, "Are you curious about the transition from the Associate degree to the Bachelor in particular?" The answer was yes, of course. Naturally, this is about his academic transition story, and Bobby was keen to start talking immediately on his transition experience story, not the reason why he selected the Associate degree. He was welcomed to tell all about his story at any stage of his academic transition. He was confronted with the Bachelor degree expectation and believed that students learnt to cope and learnt to do as decided by the Bachelor degree course. He believed this system would weed out those students that wanted to become engineers from the rest. Bobby believed it was not bad to have to make a self-skill learning and study adjustment as part of the transition from the Associate degree to the Bachelor degree.

Summary

All the participants in the above twelve cases completed their Associate degree of engineering, transitioned into the Bachelor degree of engineering and completed successfully. One important protection factor that assisted their success and lowered the barrier was knowing that the university community wanted them there and would look after their safety in all circumstances. The university provides this assurance by creating within the university environment in Australia for minority groups a "*Safer Communities program-Your Safety & Security*". This service provides professional development to all academic and administrative staff and students on how to treat, respect and assist minority groups such as women, LGBTQ and indigenous people within the university campus. This service centre provides a platform and a place of refuge for the minority groups to go to if there is any social or academic crisis in the university. This paper presents in full Caroline's case out of the twelve cases for this paper presentation.

Caroline's Final Narrative - Restorying.

Caroline's ordinary world was the completion of secondary school and living at home with her parents before she decided to become an engineer. Caroline's engineering academic transition story started with the word "my introduction to engineering". This statement was the call to an engineering adventure for Caroline. A journey into an unknown world with challenges, self-doubt and heroic actions to become a professional engineer. Caroline described herself as bold and courageous to make this decision.

Caroline wanted to do a Bachelor degree in engineering, but there were two significant obstacles in her way. She was afraid of failure in a university environment setting, and she had a low score when she completed the high school certificate that made her feel unprepared to do a Bachelor degree. So, Caroline investigated the concept of the pathway in a dual-sector university and discovered the Associate degree in engineering course as the best pathway option to address the two major obstacles in her goal of becoming a professional engineer. Caroline was making life choices based on her high school completion score and her confidence to fit into the university settings. So, she decided to delay her quest for a Bachelor degree and to enrol in an Associate degree, a junior college degree. Caroline explains that her plan from the start was to use the Associate degree as a pathway into the Bachelor degree course. She enrolled in the Associate degree in engineering in 2013 knowing that she did not do year twelve mathematics and physics. Caroline explained that she was one of two females that enrolled in the course in that year. This action to enrol into an Associate degree was the beginning of her engineering career journey.

Immediately after the enrolment into the Associate degree, Caroline realised the academic challenge ahead in doing engineering at a university; Caroline recalled, "the first two weeks I did not think that I could do engineering and so I was having a bit of a meltdown to my mom. I cannot do this; I am dropping out". Caroline's mom encouraged her to continue. She has now crossed the threshold and using her mum as a helper and source of strength. Caroline decided to tap into her inner coping strength to deal with this new test. The challenge was big for her because she had not done the mathematics or the physics in year twelve, so that was a critical event in her academic transition story. This time was the defining moment, and the answer was to deal with it and cope with the stress of learning Mathematics and Physics at the university level. The Associate degree learning environment was a lot easier to work with for Caroline, and the course provided a Foundation engineering mathematics that helped Caroline. She said, "Having that extra maths, the foundation mathematics, the maths zero, was good for the Associate degree".

Caroline endured the supreme ordeal of sitting in the same lecture room with the regular Bachelor degree students to do a transition elective in case she chooses to transition in-to a Bachelor degree after completion of the Associate degree. She recalled that loving the concept of doing Fluid Mechanics as a university transition unit where the Associate degree and Bachelor degree students were combined. According to Caroline, It was good having one, transition unit instead of going straight away into a real university kind of set up. Doing a transition university subject in the second year of the Associate degree was a positive experience for Caroline. She was able to experience and feel what it was going to be like in the Bachelor degree. She was successful in passing the Fluid mechanics transition elective and very happy that she was ready for the Bachelor degree learning environment.

Caroline overcame the most significant challenge and took possession of the treasure by completing her Associate degree of engineering course and ready for the final education of becoming professional engineer, her enrolment into the Bachelor degree of engineering course.

The enrolment into the Bachelor degree by the graduates of the Associate degree articulating into the Bachelor was daunting. Caroline felt that it would be good if there was a recommended timetable so that the articulating graduates did not need to self-allocate into classes for their timetable. It is preferable to a recommended unit list and timetable that tells the new Associate degree students what to do for the new Bachelor degree course. The issue is that the Associate degree graduates have already done most of the subjects that the regular Bachelor degree students have in their study plan for the stage the articulating students were joining the course. So, the articulating students are required to choose other ones from outside the planned Bachelor degree stage timetable. This usually produced timetable clashes. As Caroline recalled, it would be good if they could have somewhere to check which one will not clash before enrolment. It would be useful to have a specialist course planner or timetable planner for the articulating students from the Associate degree graduates into the Bachelor degree during this period of transition.

While battling with enrolment into a Bachelor degree for the first time, Caroline was equally very happy with her achievement and a boost in her confidence for a big achievement of her completion of the Associate degree in engineering. She was very happy going to the ceremony and being presented with the award certificate. She got her biggest confidence boost from the award ceremony. That was good. There was a recollection of another big moment, getting the golden key award normally given to the top fifteen per cent of graduating university students. This reward was her biggest return with the elixir.

Caroline was happy and grateful for a good preparation received from the Associate degree and found learning groups in the Associate degree had assisted her towards her education to become a professional engineer. As a result, she has become a solitary learner doing the Bachelor degree. She enjoys studying this way because she learns better by herself, but that was because she had built up the foundation knowledge in the Associate degree.

Caroline was overjoyed with how the university has developed her and allowed her to pursue her engineering career. She finally recalled “Getting my certificate to say that I have completed the Associate degree was the biggest moment. It was good to have an actual degree. So, if anything ever did happen before the completion of the Bachelor degree, I have always got the Associate degree to fall back on which is good”. This narrative is an incredible outcome for the minority group in higher education.

The summary from this narrative research study is useful feedback information into the academic transition of the graduates of the Associate Degree into the Bachelor Degree programs. The following is a brief summary of Caroline’s case using Schlossberg’s transition theory to summarise Caroline’s narrative result.

Caroline: Key findings from the narrative

1. Doubt of ability to do engineering study.
2. Encouragement from family stopped dropping out of Associate Degree.
3. Doing Fluid Mechanics as a transition unit 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 a learning group in the Bachelor program.

Caroline’s narrative result is an important demonstration of the participant’s voice as a useful source of feedback in engineering education research and to gain the understanding that voices of marginalised and minority groups such as women, LGTBIQ and indigenous people are essential to the development of the modern economy.

It would be useful to the vocational education graduates to have the transition activities that the higher education is promoting and advocating for the Vocational education graduates joining the Bachelor degree course in the middle of the Bachelor degree course program based on research by Gale et al. [7] as shown in Table 1.3. The institution needs to create a suite of transition activities that are designed for the conditionally-admitted Vocational educational students into the Bachelor degree courses. It is important to note that the existing transition induction programs designed for students admitted through the regular first-year entry requirement admission do not serve the vocational education graduates effectively in their transition to higher education university. This condition affects more drastically the marginalised and minority groups such as women, LGTBIQ and indigenous people and we need to use this forum to highlight the importance of promoting the education institutions to pay attention to the marginalised and minority groups. More qualitative research is required to assist the policymakers to create transition protocol to assist the minority groups during their articulation into higher education or College Bachelor degree programs.

Table 1.3 A Typology of Student Transition in Higher Education

Conceptions of student transition	Transition metaphors	Types of transitional change: from one to another	Transition dynamics	Illustrative transition activities/emphases/ systems
<i>Transition as Induction (T₁)</i>	Pathway; Journey; Milestones	Incultation: sequentially defined <i>periods</i> of adjustment From one institutional and/or disciplinary <i>context</i> to another	<ul style="list-style-type: none"> • Navigating institutional norms and procedures • Linear, chronological, progressive movement • Relatively fixed structures and systems • Crisis as culture shock (contextual familiarity) 	<ul style="list-style-type: none"> • Orientation/familiarisation with campus (facilities etc.) and significant staff • ‘Just-in-time’ information re procedures, curriculum content, assessment requirements • First-year seminars • Institutionist transition pedagogy (Kift 2009)
<i>Transition as Development (T₂)</i>	Trajectory; Life stage;	Transformation: qualitatively distinct <i>stages</i> of maturation From one student and/or career <i>identity</i> to another	<ul style="list-style-type: none"> • Navigating sociocultural norms and expectations • Linear, cumulative, non-reversible movement • Discrete, singular, consecutive identities • Crisis as critical incident (identity forming) 	<ul style="list-style-type: none"> • Mentoring programs • Service learning and field placements • Career and research culture development activities/emphasis • Career and research culture development activities/emphasis • Championing narratives of student and career trajectories by successful students and staff

<i>Transition as Becoming (T₃)</i>	Whole of life; Rhizomatic	Fluctuation: perpetual series of fragmented movements Lived reality or subjective experience, from birth to death	<ul style="list-style-type: none"> • Navigating multiple narratives and subjectivities • Rhizomatic, zigzag, spiral movement • Flexible systems/fluid (ephemeral) identities • Crisis as neither period/stage specific nor necessarily problematic 	<ul style="list-style-type: none"> • Individualist transition pedagogy • Flexible student study modes, including removal of distinction between full-time and part-time study and min./max. course loads • Flexible student study pathways, including multiple opportunities to change course and enter, withdraw and return to study throughout life • Curriculum that reflects and affirms marginalised student histories and subjectivities • Connectionist transition pedagogy (Hockings et al. 2010)
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Source: Gale, T & Parker, S, *Studies in Higher Education*, 2014

Although the voyage of Caroline was narrated fully in this paper, it is worth noting that the transition of vocational education graduates to higher education bachelor's degrees in engineering was a success story for all the participants in this research. The twelve participants in this research study had a successful transition to a Bachelor degree in engineering, as shown in Table 1.4: Transition from Vocational to Higher Education for participants.

Associate degree Graduates	Bachelor degree enrolment after graduation from the Associate degree and One key reason for a successful transition as a result of the completion of the Associate degree.
Caroline	Mechanical Engineering Removed previous self-doubt capability to do engineering at the university.
Sofia	Civil Engineering Overcame the barrier of cultural and language issues before starting a Bachelor degree.
Landau	Civil Engineering Prepared Landau to get a job as an associate engineer if he was unable to complete the Bachelor degree since he has already gained a one-degree award.
Bobby	Robotics and Mechatronics Engineering Gained self-confidence in knowing that he had a good engineering foundation study and Bobby believed it was not bad to have to make a self-skill learning and study adjustment as part of the transition from the Associate degree to the Bachelor degree.
Chris	Civil Engineering Prepared Chris for the level of workload expectation requirements for doing a Bachelor degree. He was prepared by overloading in his last semester of the Associate degree as the best transition to the Bachelor.
Lassy	Double major-Civil Engineering & Business Prepared Lassy very well for the transition to the Bachelor degree due to the Student-centred approach by the teachers in the Associate degree. He reported that taking the initiative was the biggest asset students must have in doing a Bachelor degree.
Tony	Mechanical Engineering Provided Tony with a two years degree-award to see whether he could commit more time to become a professional engineer. Since he was unsure, how long he could commit to a university study to become a professional engineer. He was, however, willing to try. Two years of the Associate degree course fitted perfectly into Tony's timeframe to try as compared to four years of a Bachelor degree course.
Jackson	Mechanical Engineering Overcame the barrier to transition from a technical career to a professional engineer.
John	Civil Engineering Created an opportunity for the minority group to gain admission to Bachelor degree even when the high-school final score stipulated that you are not qualified to do the university bachelor degree.
Brown	Civil Engineering Provided to Brown, the necessary foundation in engineering maths and science that are required to do a Bachelor degree in engineering successfully.

Lucky	Mechanical Engineering Stopped lucky from procrastinating about career choice. As an unsettled high-school adult, Associate degree provided lucky with certainty that it is possible to become a professional engineer after completion.
Stallion	Civil Engineering Transitioned from professional entertainer to a professional engineer which are two very different disciplines.

All the participant's cases in Table 1.4 were originally told that they were not qualified to enrol in the Bachelor degree in engineering due to their minority circumstances, and they have low final scores for their high school completion. There was only one choice for all the participants to pursue their goal of becoming a professional engineer; this was to enrol in vocational education programs as a pathway to achieve their career goal. Also, all the participants had a low maths and science proficiency before their enrolment into the Associate degree in engineering. This research demonstrated that the minority groups would be disadvantaged in gaining an opportunity to become a professional engineer without a program like an Associate degree in engineering.

This paper demonstrated that the Associate degree in engineering has successfully prepared all the participants researched for a successful transition into a Bachelor degree in engineering in Australia.

Conclusions

This paper argues that the current version of pedagogy for the higher education has separated teaching from research and a new form of pedagogy that promotes practice-based research would be beneficial for the vocational education graduates articulating into the higher education university, and it requires practice-based pedagogy adjustment to encourage our minority group to contribute to the national economic growth.

The sky has no countries boundaries, listening to marginalised and minority groups such as women, LGBTQ, and indigenous people is important to address a global economic issue with no country boundary. Improvement in pedagogies differences between the post-high school and university degree may improve access to the bachelor degree of engineering to a minority group and help to grow the national economy of the developing nations by tapping into the neglected population human resources.

References

- [1] D. J. Clandinin and F. M. Connelly. *Narrative Inquiry: Experience and story in qualitative research*. San Francisco: Jossey-Bass, 2000.
- [2] F. M. Connelly and D. J. Clandinin. *Narrative Inquiry*. In Green, J. L., Camilli, G., & Elmore, P. B. (Eds.). *Handbook of complementary methods in education research*. (pp. 375-385) Washington, DC. Lawrence Erlbaum Associates Inc, 2006.
- [3] L. Alao, L. Mann and M. Bryant, "Using narrative analysis in engineering education research to investigate students' academic transition". *Australasian Association for Engineering Education Annual Conference*, Coffs Harbour, NSW, Australia, 2016.
- [4] L. Alao and L. Mann, "Using Narrative Research Findings as Student Voice for Providing Insights into Transition Experiences in Engineering Education". *Australasian Association for Engineering Education Annual Conference*, Manly, Sydney, Australia, 2017.
- [5] M. L. Anderson, J. Goodman and N. K. Schlossberg. *Counselling adults in transition: Linking Schlossberg's theory with practice in a diverse world* (4th ed.), New York, NY: Springer Publishing Company, 2012.
- [6] A. L. Pawley and C. Phillips. From the mouths of students: two illustrations of narrative analysis to understand engineering education's ruling relations as gendered and raced, 121st ASEE Annual, 2014. Conference & Exposition, American Society for Engineering Education, 2014.
- [7] T. Gale and S. Parker. "Navigating Change: a typology of student transition in higher education," *Studies in Higher Education Conference*, Vol.39, No.5, 734-753, 2014 <http://dx.doi.org/10.1080/03075079.2012.721351>.
- [8] S. Kift, K. Nelson and J. Clarke, "Transition Pedagogy: A third-generation Approach to FYE – A case study of policy and practice for the higher education sector." *The International Journal of the First Year in Higher Education*, 1(1), 1-20, 2010.
- [9] M. Zukas and J. Malcolm. "Pedagogies for Lifelong Learning:-Building Bridges or Building Walls?" <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.593.4296&rep=rep1&type=pdf>, 2002.
- [10] L. Watson. and J. McIntyre. *Scaling Up Building engineering workforce capacity through education and training*, Australian National Engineering Taskforce (ANET), 2011.