DIVERSE PERCEPTIONS AMONG ENGINEERING STUDENTS AND STAFF OF THE ENABLERS AND CONSTRAINTS OF ACADEMIC RESILIENCE

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ABSTRACT

High dropout rates and a lack of academic resilience continue to plague South African higher education. Often, this is more prevalent in practical disciplines that have been subjected to curriculum changes in recent years, such as engineering. It is challenging to understand academic resilience in university settings due to insufficient research. Therefore, more information is needed on the role of personal characteristics and the socio-ecological university environment in enabling and constraining students' academic resilience. To assist higher education institutions in theorising academic resilience, this article presents a novel conceptual framework of Ungar's social-ecological theory, and Ebersöhn's Flocking theory. As part of this theorisation, this article also provides diverse perspectives on academic resilience from engineering students, lecturers, and support staff through semi-structured interviews. An analysis of this qualitative data was conducted using thematic analysis. A major finding of the study was that enabling factors were principally personal, whereas constraining factors were principally socio-ecological. Findings led to the development of an original framework for conceptualising the enablers and constraints of academic resilience in engineering students. This conceptual framework could guide towards the identification of areas of priority for academic resilience and in doing so contribute to interventions to reduce student dropout.

Keywords: academic resilience, Bachelor of Engineering Technology (BEngTech), constraints, enablers, Flocking theory, social-ecological theory, student resilience

INTRODUCTION

The South African university system continually faces difficulties related to high dropout rates and a failure to demonstrate academic resilience (Bantjes et al. 2020; 2021). Academic resilience refers to a student's ability to attain academic achievement and flourish by recovering from academic failures despite adversity (Martin and Marsh 2006; Morales 2008). The topic of academic resilience among youth in school settings has been researched (Cortina et al. 2016; Dass-Brailsford 2005; Theron 2012; Van Rensburg, Theron, and Rothmann 2018). Based on these studies, it has been suggested that school learners need to be more academically resilient (Borman and Overman 2004; Martin and Marsh 2006). Therefore, a lack of resilience at the school level has implications for students transitioning into higher education.

Students in engineering disciplines are known to be at risk of academic failure. The Council on Higher Education (CHE) noted that half of the engineering students do not complete their studies at universities (Govender 2018). Four specific factors have been found to influence the success of South African engineering students, including the problematic South African school system, the high student dropout rates, the high cost of engineering programmes, and the requirement of professional accreditation by the Engineering Council of South Africa (Van der Merwe and Maharaj 2018). An analysis of persistence patterns among engineering students at a South African university was carried out by Bengesai and Pocock (2021). They indicated that "[s]tudent persistence in engineering can also be classified based on first-year accumulated credits, admission point scores, race, and financial aid, of which first-year accumulated credits is the most critical factor" (Bengesai and Pocock 2021, 1). The reasons engineering students leave university have been studied (Pocock 2012; Ahmed, Kloot, and Collier-Reed 2015), but these studies seem to have been informed by a single perspective. In 2017, the previous National Diploma (NDip) in engineering was nationally phased out and replaced with a Bachelor of Engineering Technology (BEngTech) degree in South African engineering schools. Unlike the NDip, the new degree qualification does not include the mandatory year of experiential learning. The implications of this are particularly relevant to the field of engineering, which provides laboratory-based practical training.

There is a dearth of data and literature concerning what enables and constrains academic resilience at the university level. Despite the available literature on engineering student success, the integration of the perspectives of engineering students, lecturers, and academic and counselling support staff appears to be lacking. Furthermore, the need for a more nuanced understanding of academic resilience is even greater in light of the changing context of the new engineering qualification which has since been adopted by all universities in South Africa.

This article reports on one aspect of a larger exploratory mixed-method case study, namely

the interviews conducted with staff and the first cohort of BEngTech students at one South African comprehensive university. The purpose of the study was to investigate whether staff and students' perceptions of academic resilience among university engineering students are similar or different. Specifically, this article discusses the role of personal characteristics and the socio-ecological university environment in enabling and constraining students' academic resilience. A major finding was that the enabling factors were primarily personal, while the constraining factors were primarily socio-ecological.

University management and support staff may be able to use these novel insights into understanding academic resilience among engineering students at universities to develop co-curricular interventions that facilitate increased retention rates and reduce dropout rates.

THEORETICAL PERSPECTIVES ON RESILIENCE

This study adopted two conceptual viewpoints despite being rooted in a more general resilience framework, in particular, the social-ecological resilience theory and the concept of "flocking together", which is an indigenous psychology theory of resilience in Southern Africa.

The first viewpoint it adopted was influenced by Michael Ungar's work on social-ecological resilience (Ungar 2008; 2011; 2015; 2018), which suggests resilience processes are not primarily rooted within individuals but operate across a continuum of micro-meso-macro dimensions. Thus, students' resilience does not solely depend on their individual characteristics. It is further increasingly recognised that resilience processes are interconnected between the personal, social, and structural (Masten 2019; Theron 2019; Ungar 2012; Van Breda 2018). When individuals are confronted with challenging conditions or severe personal adversity, the strength of the social and physical environments in which they live determines how resilient they are (Ungar 2012). As a result, the university's ability to provide students with both social and physical resources can have an impact on students' resilience.

A second viewpoint, Liesel Ebersöhn's Flocking (2019) work on indigenous resilience theory, highlights factors that constrain and enable academic resilience processes within universities. Designed to serve as an indigenous, Afrocentric, relationship-based resilience theory, Flocking is positioned as a contextual and sociocultural supplement to traditional psychology theory (Ebersöhn 2019). Flocking has pragmatic origins due to the historical injustice and wealth inequality resulting in limited resources, lack of access, and poverty in South Africa. Flocking is viewed as a socio-ecological reaction (Ebersöhn 2019) following hardships caused by inequality, high risk, and vulnerability of indigenous people in post-colonial situations. Moreover, Flocking can help us comprehend how generations with Afrocentric ethnic backgrounds support one another's wellness in difficult times by providing

a relationship-resourced resilience theory, which offers an indigenous psychological lens (Ebersöhn 2019). Universities are not immune to these inequalities in South African society, resulting in further implications for their ability to provide the socio-ecological resources emphasised by Ungar. Since most of the participants in the student sample group and the larger population for the current study come from an Afrocentric ethnic background, Flocking provides a relevant and insightful perspective of the students' academic resilience.

The current case study incorporated social-ecological theory to promote a relational understanding of resilience within a particular university context and Flocking theory to specifically emphasise resilience processes. The two conceptual viewpoints were therefore complementary, as in both the Flocking theory and the social ecology theory, the subjective experience of the individual is emphasised. A study conducted by Ungar (2011) identified four factors important for resilience, namely decentralisation, complexity, atypicality, and cultural relativity. Similarly, there are four theoretical propositions regarding Flocking (Ebersöhn 2019) which can be summarised as social support pathways, socio-ecological processes, the presence or absence of cultural competence, and cultural beliefs and practices. A graphic representation of both conceptual views is shown in Figure 1.

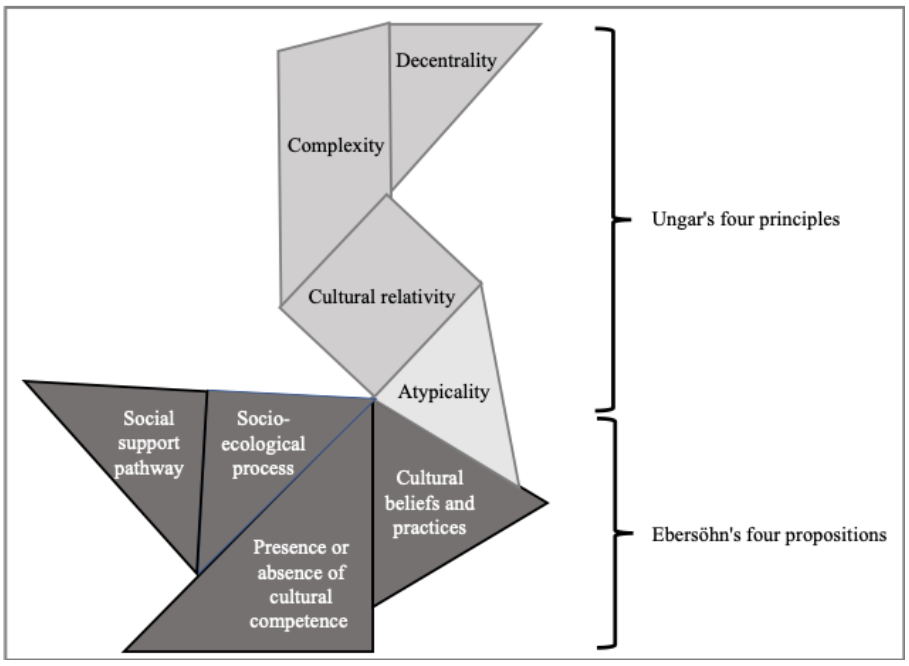

Figure 1: Graphic representation of the conceptual framework for this study – Ungar's four principles and Ebersöhn's four propositions (Source: Mapaling 2023)

Figure 1 graphically represents a tangram of a bird, specifically a blue crane. As depicted in the tangram, the bird represents Flocking, while the tangram symbolises resilience from the viewpoint of Ungar. The varying sizes of the tangram pieces illustrate the inequality referred to

in Flocking (Ebersöhn 2019). At the same time, it illustrates the stress levels experienced by different populations under varying conditions according to Ungar (Talesnik 2021).

METHODOLOGY

As part of a larger exploratory mixed-methods case study, standardised risk and resilience psychometric measurement tools were administered to 66 final-year BEngTech students for the quantitative phase. These results and other findings stemming from the larger study have been published elsewhere (Mapaling, Webb, and Du Plooy 2021; 2022; Mapaling 2023) and therefore do not form part of the current article. This article reports only on the qualitative phase.

Instead of focusing on a single perspective as is the case in other studies on resilience and engineering student success (Burton and Dowling 2009; Van Wyk et al. 2022), this article examines the interaction between the perspectives of engineering students, lecturers, and support staff. All participants were purposively sampled. Student participants had to be at least 18 years old and registered for their final year of a BEngTech degree in one of the following disciplines: civil, electrical, industrial, marine, or mechanical engineering. To be included, lecturers had to have taught in the various BEngTech degree programmes for three years, from 2018 to 2020. Support staff were included in this study if they were responsible for facilitating co-curricular academic and counselling-related interventions for this cohort of students.

The qualitative phase included interviews with three participant sample groups who met the inclusion criteria, specifically 13 engineering students, 6 lecturers and 6 support staff who volunteered to participate. Separate semi-structured interview schedules were prepared for each sample group; participants were interviewed individually to gain a better understanding of their perceptions and experiences of academic resilience. The interview schedules were adapted from Morales's (2008) academic resilience study interview protocol and consisted of 16 open-ended questions. The students were first asked about their transition to university, then about their understanding of the socio-ecological context in which their academic resilience occurred, and subsequently about the personal risk (constraining) and protective (enabling) factors that influenced their academic resilience. The staff, on the other hand, were asked about their experience of the students in the new qualification, their perception of what enables and constrains student resilience, as well as the social support and socio-ecological resources they utilised to help students either directly or by referring them to other resources. Students and staff participated in separate pilot studies before data generation. On average, each interview lasted approximately 45 to 90 minutes. Virtual interviews process were conducted over the period of 2020 to 2021 during the COVID-19 pandemic lockdown.

A thematic analysis of the qualitative data generated from semi-structured interviews was carried out according to Braun and Clarke's six phases of thematic analysis (2006; 2020) by first becoming familiar with the data by reading, transcribing and memoing to get a general impression of the data. Throughout the study, the researchers meticulously scoured the dataset, earmarking and coding recurring patterns, ideas, and points of significance directly linked to the research question. The researchers then systematically sorted these initial codes into clusters, marking the embryonic stage of potential themes that began to hint at larger patterns within the data. Thereafter the researchers engaged in a rigorous review of these tentative themes, cross-verifying them against the original dataset and examining their cohesion within the coded extracts to ensure their validity and consistency. Upon further refinement of these themes, the researchers concentrated on capturing the essence of each theme, defining its core concept and assigning descriptive labels that effectively encapsulated its content and scope. Finally, rather than a mere descriptive presentation, the researchers crafted an analytical report that weaves a coherent narrative, demonstrating how these themes address the research question and contribute to the broader discourse, which can be seen in the findings and discussion sections which follow this methodology section. Moreover, thematic analysis enabled the inductive generation of codes and themes (Braun and Clarke 2006). During each phase of thematic analysis, Lincoln and Guba's (1985) criteria for trustworthiness were implemented as proposed by Nowell et al. (2017), including transcription of interviews, triangulation and independent co-coding of themes and subthemes. A light edit was made to the transcriptions during analysis to facilitate easier reading. As the study focused on BEngTech engineering students, engineering lecturers, and support staff at a single comprehensive South African university, the findings cannot be generalised to other contexts and institutions of higher education. Only final-year students were included in this study who would have had a clear sense of their academic success and perseverance. The findings may differ if the study were to be replicated with students in their first or second year.

The University's institutional ethics committee approved the use of this data (ethics approval reference number: H20-EDU-ERE-026) after obtaining institutional approval from relevant university officials. In line with ethical guidelines, written and verbal informed consent was obtained from each participant before recording any of the interviews. During data analysis, pseudonyms were assigned and coded per sample group to ensure anonymity. Pseudonyms were coded as follows, final-year engineering students all start with an "F" (for example, Frank), lecturers start with an "L" (for example, Luke), and support staff start with an "S" (for example Sally).

FINDINGS

Demographic information

Students self-identified according to their race, with six identifying as Black African, three identifying as Coloured, and three identifying as White. Among the student participants, the mean age ranged from 23.5 to 28 years of age. In this sample, four students were from electrical engineering, four civil from engineering, two from marine engineering, two from industrial engineering, and one from mechanical engineering. In terms of nationality, four students were international students from Africa, while the remaining nine were South Africans. It was possible for participants to volunteer other gender identifications. Ten students self-identified as male, while the remaining three identified as female.

Regarding demographic information of staff, two of the lecturers included were from the Department of Electrical Engineering, two from the Department of Industrial Engineering, and one each from the Department of Mechanical Engineering, and the Department of Civil Engineering. Among them, two held the academic rank of lecturer, two were employed in the institutional leadership position of department head, and two were senior academics in the associate professor position. Approximately 143 years of academic experience were accumulated by the six academic staff interviewed, which was complemented by 49 years of experience in industry.

Most of the support staff interviewed (four) were employed by the learning and teaching division of the university. The remaining two were employed by the School of Engineering and the section responsible for the university's meal management system, respectively. Three of the support staff provided informational support of an academic nature to students, and the remaining three provided engineering students with varying levels of personal and relationship support.

Previously, we noted that this article constitutes one phase of a more extensive mixed-method exploratory case study. In the qualitative phase of this study, which has already been reported (Mapaling 2023), we delineated six primary themes and seventeen subsidiary sub-themes. This article focuses on the second theme related to factors enabling and constraining resilience and its related sub-themes. The theoretical frameworks related to the enabling and constraining resilience factors are presented in Table 1.

Table 1: Resilience factors

Theme	Ungar's Socio-Ecological Approach	Ebersöhn's Flocking Theory	Literature
Factors that enabled and constrained engineering students' academic resilience	Resilience is the ability to access resources that support wellbeing, while being delivered and experienced as culturally meaningful.	Requires the provision of social resources to enable a collective to become more resilient.	The ability to adapt positively in the face of severe adversity is an indicator of resilience (Luthar et al. 2000).

Table 2 reflects the factors that enabled and constrained the engineering students' academic resilience as reported by students, lecturers and support staff.

Table 2: Enabling and constraining factors

Theme	Students	Lecturers	Support Staff
Factors that enabled and constrained engineering students' academic resilience	Sub-theme 2: Students reported having to deal with adversity, such as adapting in a new country, transitioning to online learning, and adapting to increasing workload, language barriers, and family commitments.	Sub-theme 9: Factors that constrained engineering students from persisting with their studies: responsibilities related to phase of life of the student, and first-generation students. Sub-theme 10: Factors that enabled engineering students to persist with their studies: motivation, maturity, passion, and role modelling. Sub-theme 7: Lecturers noted changes in lecturer and student engagement since the introduction of the BEngTech degree.	Sub-theme 15: Support staff spoke about the double-edged sword of COVID-19. Sub-theme 12: Support staff said that success is dependent on effort.

Factors that enabled engineering students to persist with their studies

Students are driven by different personal reasons to persist with their studies, especially after being faced with adversity. The lecturers pointed out that students must demonstrate maturity in their reasoning and must devise an action plan for achieving their goals. They noted that achieving academic resilience requires consistent hard work to enable a change in behaviour and lifestyle. It was Leonardo's belief that students are motivated by the possibility of finding employment after completing the course: "... the student, the graduate, the type of graduate, graduated student that we prepare for industry always finds a space to go and work, and that's a message ...".

His description of the qualities exhibited by alumni who had graduated from the programme and found employment included maturity and work ethic.

> "Fabian stood out because he's 26, 27. He's more mature, he spent time after finishing school doing a few things and he had clarity as to what needed to be done and certainly that motivated him because he knew this is what he wanted to do. He was a very hardworking student and it's the same for Miss [February] as well. She was very dedicated, very hardworking. She had clear objectives as to what she wanted to achieve, and again that made her a very successful student ... even from a first-year perspective they were very clear as to where they wanted to be, what they needed to do in order to get the results that they wanted to achieve and that is why they are the first three graduates."

A similar sentiment was noted by Finley, who describes how he exceeded expectations through

his work ethic and hard work, passing even when he was expected to fail: "I work very, very hard to actually manage to pass". Furthermore, Lionel suggested that those students who are successful are those who are determined, despite sometimes not having a passion for the career:

> "[For some students] it was not their first choice to do electrical engineering .... So those students, start on the back foot. So, for those students, they don't have a feel for electricity or electrical engineering. Or maybe any engineering. And they have to come to terms with that .... They are determined just to get the piece of paper that is as much as their aspirations rise to. But for others they start to enjoy it, they start to understand the problem and the joy of being able to achieve something."

Similarly, Farai shared how it was necessary for her determination to exceed her passion for what she was studying.

> "I am a person who does not give up so easily, and when I tell myself that I need to fight, besides passion because at some point it's not all about passion, but it's about achieving what you want. It's about just achieving what it is about taking whatever that is coming to you. So, I'm so determined to the point that I can fight in it."

Based on his experience, Lionel said that students are forced to persevere through the degree and do well because it is their only chance at success, of breaking generational boundaries and finding employment. However, this was not the case for all students, as some students often begin to find their place in the career and enjoy what they are exposed to. Lynn similarly commented that in her experience, students are determined and motivated to perform well once they have discovered their role within their career and within society:

> "I think the minute you had a student that applied to be an engineer that got the academic qualification and got into the course, the minute they start realising what important role they are going to play in society one day, I think they automatically start seeing the importance of the career .... So, I think that once the students start realising these things regarding the role they're going to play, they actually understand the importance of the career they have chosen, which motivates them to study a bit harder and do what they need to do."

Perseverance was echoed by the student participants as an enabling factor. Frank described how he had persevered when faced with any form of adversity:

> "Just not taking no for an answer .... Like if I feel like okay now this thing, I can't do it, to something like just find a way to do it. Get some help you know. Watch some YouTube videos, get some support. Try and get this thing going. Even though it seems like now I can't do this thing or something, just find a way, come up with a way, try and get through it. Try and solve the problem."

Levi pointed out that role models are crucial in motivating students to persevere in their studies and perform well:

> "I think role modelling plays a big role, if students are, are not given a good example or a lecturer speaks down to them and doesn't treat them as a person. I think that, to a large degree, affects how successful they're going to be, and their outcomes."

From the findings, it emerged that students need to be placed at the center of academic and personal support initiatives. Finley expressed his sentiments by saying: "[the lecturer] helped me a lot to be able to stay". Fadil shared his overall sense of support from his particular engineering department as follows: "You could go there with a problem and someone was there to fix it, help you out ... there was a more humane factor to it". Finn expanded on this aspect: "I think some of the lecturers ... went the extra mile for us" From the perceptions of these participants, it appears that overall student-centredness is an enabling factor.

Both students and support staff agreed that help-seeking behaviour and a sense of belonging were two related enabling factors. Fabian stated that, "You have to engage with people. If you don't, you can't get anywhere fast because you can't do everything on your own." Siphokazi stressed that students should "Ask for help and ... create a community within". Fanele agreed with this view: "You have to ask for help".

Factors that constrained engineering students from persisting with their studies

Lecturers noticed a variety of factors that constrained students from persisting with their studies: "… many of them are married with children by that stage, so that's another issue .... Uhm, so having other responsibilities or shifting priorities depending on their phase of life."

Lionel thus confirmed that different factors affect students' resilience, such as the different stages of life. Additional responsibility, outside of one's academic life can contribute towards a student experiencing psychological distress. During the course of their engineering studies, students experience this type of distress and negative affective states such as stress and anxiety as asserted by Farai "it actually gives us a lot of pressure and even stress on us". These negative affective states serve as constraining factors which affect students' ability to be resilient. Students were not the only ones experiencing distress, as suggested by Lionel, "It's much harder for the staff as well". This is further evidenced by Sophia who mentioned that life as a university staff member since the COVID-19 pandemic "has been hard to deal with".

Lukas suggested that student resilience was constrained due to the financial costs associated with studying engineering: "I'm going to tell you now straight, it's a financial thing. I think that's become a lot better since the NESFAS and the free education." On the other hand,

Levi mentioned that students do not persist with their studies due to an initial lack of interest in the course:

> "To my mind, the biggest reason why that type of person might fall out is that engineering was not really their calling. You can see it sometimes at the beginning of a year with a new group of students. Some of them simply wanted to go and study to get away from the situation, the environment that they're in so they study anything."

In addition, Farai indicated, "It's actually me who created a barrier, not that other environments created a barrier for me. I would say that number one was language." As far as experiencing a language barrier was concerned, Francis shared the same experience: "Also, the language, the accents".

According to Samantha, the student's home environment has a significant impact on their ability to adapt to the change to online learning:

> "... there's just been so much change, many people don't cope well with change to begin with. There are all these sort of the scary things happening in the world and having to go online and you are not [set] up and you're in a home environment that's maybe not conducive or supportive of you doing your best academically. And you may not have the right resources either."

Engineering students have a busy academic schedule. Student participants, such as Fundo described struggling with the increased workload.

> "I could say one big challenge is keeping up with deadlines. Especially 'cause the workload is extremely different from what we had in high school so moving from a light workload to a full workload on a daily basis was quite a challenge and it takes a lot of time to adapt to it."

International students and students coming from other provinces felt that adapting to a new country or province was a constraining factor. Francis, from Zimbabwe, could relate to this: "I was alone, so there was that whole thing you know, like you, you are away from home ...".

DISCUSSION

While a well-known consensus exists among local and international experts that resilience is characterised by the ability to adapt positively in the face of severe adversity, when considering enabling and constraining factors the student data from this study provide a more nuanced picture of the students' resilience. Literature confirms that resilience refers to both the ability of individuals to access social, psychological, cultural, and physical resources that contribute to their wellbeing, as well as their ability to negotiate for these resources to be provided and

experienced in a culturally meaningful manner, both individually and collectively (Ungar et al. 2007). As with Ebersöhn's Flocking Theory (2019), it is proposed that social resources must be provided to enable collectives, such as engineering students, to become more resilient. The crux of this discussion focuses on the enabling and constraining factors of academic resilience which has been theorised in school settings by many international theorists (Borman and Overman 2004; Gayles 2005; Martin and Marsh 2006; Morales 2008; Kuldas, Hashim, and Ismail 2015; Cassidy 2016; Ahmed et al. 2018; Holdsworth, Turner, and Scott-Young 2018) but is largely absent in discussions of university level. This discussion aids in the theorisation of academic resilience within South African higher education settings.

Enabling factors

Several factors have been identified by lecturers as contributing to engineering students' resilience. These factors include self-determination, maturity and motivation to succeed in their degrees and careers, as well as the presence of a role model in their lives. This study found that lecturers are increasingly utilising technology and social media to enhance their student-centered teaching, a shift necessitated by the requirements associated with the new BEngTech degree and the recent shift to online learning. Support staff were required to think creatively about new ways to support students virtually with limited resources, which is consistent with the literature. Ebersöhn's Flocking's Theory (2019) is in agreement with Ungar et al. (2007), as it emphasises the need to use resources creatively in order to support individuals. Further, qualitative data generated from support staff confirmed their view that COVID-19 contributed significantly to the engineering students' inability to persist. In addition, the support staff participants reported that students' success depends on the amount of effort they put into their work, also confirmed by student participants.

Constraining factors

As confirmation that resilience goes beyond a combination of individual traits (Ungar 2008); students were constrained by various external factors. Based on the data generated from student perceptions, it was concluded that this cohort of engineering students had experienced adversity such as adjusting to life in a new country, transitioning to online learning, adjusting to a greater workload, language barriers, and family obligations. An analysis of the lecturers' perceptions revealed that factors that impeded engineering students from completing their studies included first-generation status and responsibilities related to the student's life phase at the time of data generation (for instance, childcare responsibilities or relationship status). There is an existential commitment to connection represented by the Flocking theory (Ebersöhn 2019), which may be

viewed as a reflection of the resilience of relationships. Thus, relational resilience could assist students whose academic resilience is affected by competing family responsibilities.

Student and staff perceptions of enabling and constraining factors

This study reveals that, in contrast to the lecturer and support staff's perceptions, the student data provides a more inclusive picture of the students' resilience. Students view staff as a resource part of their academic resilience processes, which is consistent with the work by both Ungar and Ebersöhn. According to Ungar (2012), complex triads (for instance, students, lecturers and support staff) are interconnected in a way that can facilitate the exchange of resources, thereby enhancing the growth and resilience of individuals, as well as reducing their risk exposure. Similarly, a single individual cannot flock (Ebersöhn 2019). The act of flocking contributes to social resilience and embodies constructive social support. Therefore, the process of flocking involves both implicit and overt social support.

Instead, staff participants provide a more external picture of how students had to adapt to the university and the engineering-specific obstacles they had to overcome as they managed personal and environmental stress that was further compounded by COVID-19. This discrepancy between what students and staff perceive about academic resilience is likely the most salient and unexpected finding of the study. Students were found to place a greater emphasis on internal positive factors, while staff perceptions focused more on deficiencies in the socio-ecological university environment. For instance, when prompted to discuss student resilience, staff and students reported different concerns. Staff members were less likely to foreground the enabling factors that students discussed, such as how they persevered and overcame adversity over the years. Compared to students, staff tended to be more focused on factors constraining students' academic resilience, such as financial difficulties, and when students were experiencing psychological distress and negative affective states. Therefore, it would appear that staff perceptions of academic resilience differ significantly from student perceptions, and that the two sample groups perceive student resilience differently. Figure 2 depicts a suggested framework of how the enablers and constraints of the academic resilience of engineering students can be conceptualised.

A dynamic relationship exists between the enablers and constraints of academic resilience as is represented by the bidirectional arrows in Figure 2.

In consolidating the discourse woven through this discussion of the findings, one arrives at the threshold of understanding that resilience, particularly academic resilience, is a multifaceted construct inextricably linked to the cultural, social, and psychological ecology of

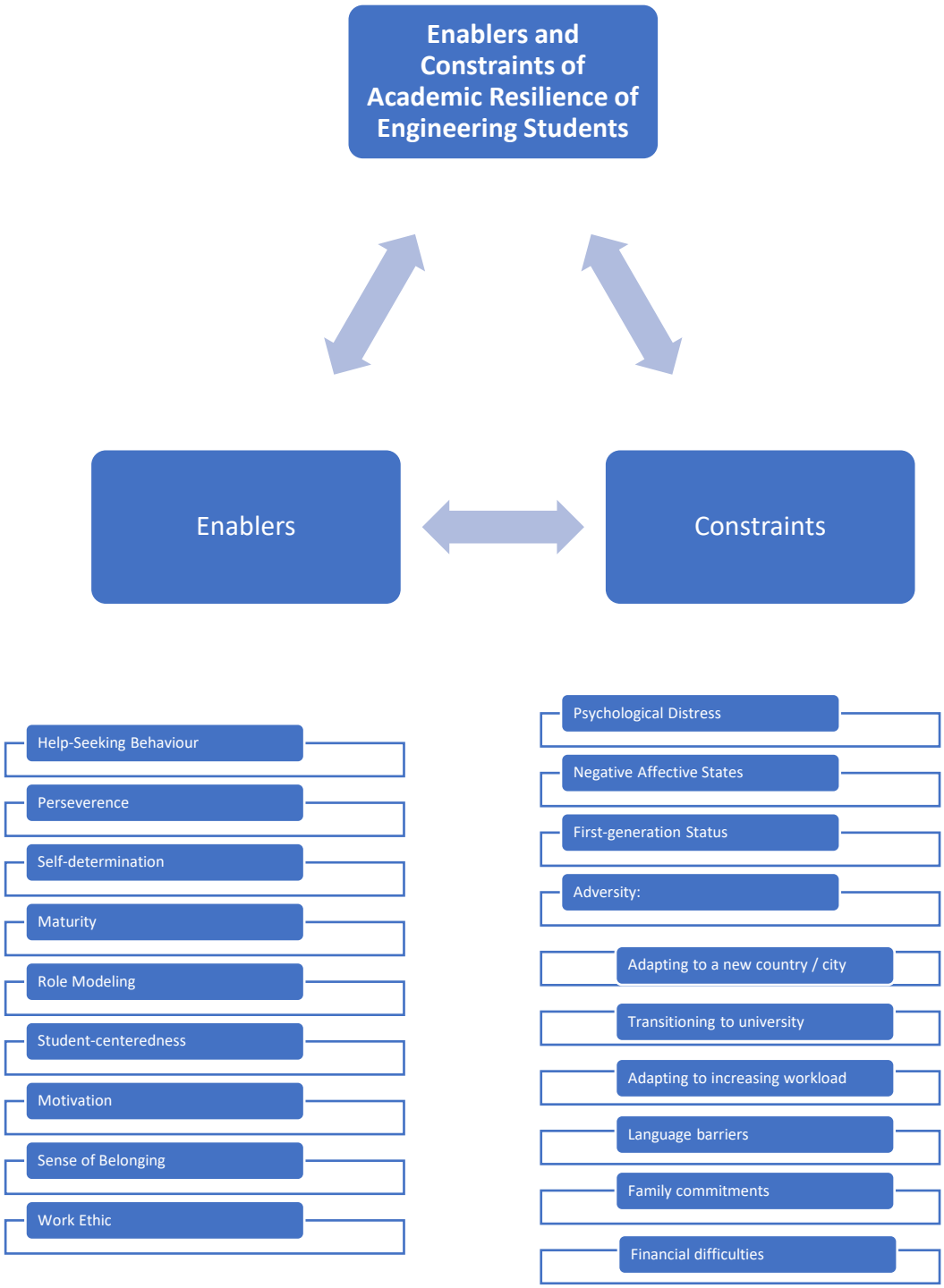

Figure 2: Enablers and constraints of the academic resilience of engineering students

the students, as confirmed by Ungar (2012). Recognising this nuanced perspective broadens the scope of our discussion beyond the traditional paradigm that has marked previous explorations of resilience, and emphasises the need to recognise the individual, collective, and systemic factors at play in South African higher education.

Historically, South African higher education has grappled with considerable adversity. Challenges rooted in apartheid-era inequalities and exacerbated by contemporary

socioeconomic disparities have formed a turbulent context for South African students. However, these unique challenges also present an opportunity for transformation, a chance to foster resilience as a key response to adversity. Indeed, it is within such contexts that Ebersöhn's Flocking Theory (Ebersöhn 2019) finds particular resonance, suggesting that collective resilience may be a viable pathway to overcoming adversity within South African universities.

The present landscape of South African higher education is a testament to the power of resilience. Despite the adversities faced, students continue to adapt, persist, and excel. However, the importance of negotiating for resources to be provided in a culturally meaningful manner must not be underestimated, echoing the sentiments of Ungar et al. (2007). The fostering of this resilience cannot be a passive process; it must be a concerted effort on behalf of educational institutions policy makers, and society at large.

Looking to the future, the dialogue on academic resilience must continue to evolve and expand. As evidenced by theories proposed by international theorists in school settings, such as Cortina et al. (2016), Dass-Brailsford (2005), Theron (2012) and Van Rensburg et al. (2018), academic resilience is a rich area of exploration. Yet, as the present discussion indicates, there is a critical need for these theories to be applied and tested in the context of university-level education. The South African context provides an especially rich ground for this exploration, embodying the resilience it seeks to understand and cultivate.

In concluding this discussion, resilience, particularly academic resilience in the South African higher education setting, is not an attribute to be considered in isolation. Instead, it is a complex interplay of individual and collective abilities, social resources, and cultural contexts noted by Ungar (2012). Our discussion, therefore, must not cease here. Instead, it should serve as a stepping stone toward further understanding and fostering resilience within the students. As we venture into the future, let us remember that the strength of the flock is in the bird, and the strength of the bird is in the flock. It is in this symbiosis that the key to the resilience of South African higher education may lie.

CONCLUSION AND RECOMMENDATIONS

From the framework of enablers and constraints of academic resilience (see Figure 2), we can conclude that the enablers are mostly personal factors, whereas the constraints are mostly socio-ecological factors. This study found a difference in the perceptions between staff and students regarding what enables and constrains the academic resilience of engineering students. As far as students were concerned, staff were part of their resources enabling their resilience processes, whereas staff perceived students' resilience as being external to staff and more related to the socio-ecological environment. The exploration of this discrepancy, between staff and students,

in future studies could lead to the development of better support systems for engineering students and other professionals. It can further be deduced from Figure 2 that there are more enablers than constraints which may possibly explain why this cohort of engineering students were more academically resilient than previous cohorts as reported by Sheppard et al. (2019). It is evident from the existing literature that universities do not conduct sufficient research which incorporates the perspectives of students, lecturers, and support staff. In light of this, it is recommended that future studies incorporate more diverse perspectives. The implication is that future research could inform how institutions of higher education may possibly cultivate, create and enable opportunities for transformative listening and dialogue.

It would further seem that the finding that the enablers are mostly personal factors is consistent with the conceptual viewpoints of this study (Ungar 2008; Ebersöhn 2019), which emphasise the subjective experience of the individual. Academic resilience is therefore more likely to occur if the institution introduces appropriate and personalised support systems early. The constraining factors that are mainly socio-ecological in nature, on the other hand, are more suggestive of the insufficient consideration which, as this study found, is given to the wellbeing of lecturers and support staff, especially since COVID-19. Staff wellbeing was not one of the study's objectives but rather emerged as an unexpected and yet noteworthy finding. Therefore, given the paucity of information and knowledge regarding this topic, there is a need for further research into the relationship between staff wellbeing and the implications for student academic resilience within the South African higher education context. Similarly, it is imperative for other practical disciplines with high dropout rates, to understand the academic resilience of students who require access to laboratories and specialised training spaces and equipment. The conceptualisation of the enablers and constraints found in Figure 2 is the first of its kind to be presented in South African higher education. This framework can be further developed in future research and used to inform strategies to combat student dropout through the development of context-specific academic resilience checklists and psychometric measures.

LIMITATIONS

This case study cannot be generalised to other contexts and institutions of higher learning, and further comparative studies are required to confirm that the findings of this study are also applicable to other universities where engineering is taught. There were fewer female voices and experiences represented than males, reflecting the more general demographic reality that engineering professions and engineering courses are still largely dominated by men. Although this qualitative phase of the broader study may be limited by its sample size, this exploratory study could serve as a starting point for further research using post-qualitative methods.

STATEMENT

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REFERENCES

Ahmed, N., B. Kloot, and B. I. Collier-Reed. 2015. "Why students leave engineering and built environment programmes when they are academically eligible to continue." *European Journal of Engineering Education* 40(2): 128–144.

Ahmed, U., W. A. Umrani, M. A. Qureshi, and A. Samad. 2018. "Examining the links between teachers support, academic efficacy, academic resilience, and student engagement in Bahrain." *International Journal of Advanced and Applied Sciences* 5(9): 39–46.

Bantjes, J., W. Saal, C. Lochner, J. Roos, R. P. Auerbach, P. Mortier, R. Bruffaerts, R. C. Kessler, and D. J. Stein. 2020. "Inequality and mental healthcare utilisation among first-year university students in South Africa." *International Journal of Mental Health Systems* 14(5): 1–11.

Bantjes, J., W. Saal, F. Gericke, C. Lochner, J. Roos, R. P. Auerbach, P. Mortier, R. Bruffaerts, R. C. Kessler, and D. Stein. 2021. "Mental health and academic failure among first-year university students in South Africa." *South African Journal of Psychology* 51(3): 396–408.

Bengesai, A. V. and J. Pocock. 2021. "Patterns of persistence among engineering students at a South African university: A decision tree analysis." *South African Journal of Science* 117(3/4): 1–9.

Borman, G. D. and L. T. Overman. 2004. "Academic resilience in mathematics among poor and minority students." *The Elementary School Journal* 104(3): 177–195.

Braun, V. and V. Clarke. 2006. "Using thematic analysis in psychology." *Qualitative Research in Psychology* 3(2): 77–101.

Braun, V. and V. Clarke. 2020. "Can I use TA? Should I use TA? Should I not use TA? Comparing reflexive thematic analysis and other pattern-based qualitative analytic approaches." *Counselling and Psychotherapy Research* 21(1): 37–47.

Burton, L. J. and D. G. Dowling. 2009. "Key factors that influence engineering students' academic success: A longitudinal study." In *Proceedings of the Research in Engineering Education Symposium 2009*, 1–6. Palm Cove, QLD.

Cassidy, S. 2016. "The Academic Resilience Scale (ARS-30): A new multidimensional construct measure." *Frontiers in Psychology* 7(1787): 1–11.

Cortina, M. A., A. Stein, K. Kahn, T. M. Hlungwani, E. A. Holmes, and M. Fazel. 2016. "Cognitive styles and psychological functioning in rural South African school students: Understanding influences for risk and resilience in the face of chronic adversity." *Journal of Adolescence* 49: 38–46.

Dass-Brailsford, P. 2005. "Exploring resiliency: Academic achievement among disadvantaged black youth in South Africa." *South African Journal of Psychology* 35(3): 574–591.

Ebersöhn, L. 2019. *Flocking together: An indigenous psychology theory of resilience in Southern Africa.* Switzerland: Springer.

Gayles, J. 2005. "Playing the game and paying the price: Academic resilience among three high-achieving African American males." *Anthropology and Education Quarterly* 36(3): 250–264.

Govender, P. 2018. "Joint effort needed to fix university dropout rate. Engineering students find going toughest of all, with half of them ditching their studies." *Sunday Times* May 27. https://www.google.com/url?q=https://www.timeslive.co.za/sunday-times/news/2018-05-26-

joint-effort-needed-to-fix-university-dropout-rate/&sa=D&source=docs&ust=1658954642856443&usg=AOvVaw1IjrN-ZHFO0p-1z3DqFTbP.

Holdsworth, S., M. Turner, and C. M. Scott-Young. 2018. "... Not drowning, waving. Resilience and university: A student perspective." *Studies in Higher Education* 43(11): 1837–1853.

Kuldas, S., S. Hashim, and H. N. Ismail. 2015. "Malaysian adolescent students' needs for enhancing thinking skills, counteracting risk factors and demonstrating academic resilience." *International Journal of Adolescence and Youth* 20(1): 32–47.

Lincoln, Y. and E. G. Guba. 1985. *Naturalistic inquiry*. Newbury Park, CA: SAGE Publications Inc.

Luthar, S. S., D. Cicchetti, and B. E. Becker. 2000. "The construct of resilience: A critical evaluation and guidelines for future work." *Child Development* 71(3): 543–562.

Mapaling, C. 2023. "Academic Resilience of Engineering Students: A Case Study." PhD dissertation, Nelson Mandela University.

Mapaling, C., P. Webb, and B. du Plooy. 2021. "'Everyone Plays a Key Role': Students, Lecturers and Support Staff in South Africa Talk about the Academic Resilience of Engineering Students." In *Proceedings of the 14th Annual International Conference of Education, Research and Innovation*, 7201–7207.

Mapaling, C., P. Webb, and B. du Plooy. 2022. "'I would help the lecturer with marking': Entrepreneurial education insights on academic resilience from the perspectives of engineering students in South Africa." In *Transforming Entrepreneurship Education: Interdisciplinary Insights on Innovative Methods and Formats*, edited by J. Halberstadt, A. A. de Bronstein, J. Greyling, and S. Bisset, 177–196. Cham: Springer Nature.

Martin, A. J. and H. W. Marsh. 2006. "Academic resilience and its psychological and educational correlates: A construct validity approach." *Psychology in the Schools* 43: 267–282.

Masten, A. S. 2019. "Resilience from a developmental systems perspective." *World Psychiatry* 18(1): 101–102.

Morales, E. E. 2008. "Academic resilience in retrospect: Following up a decade later." *Journal of Hispanic Higher Education* 7(3): 228–248.

Nowell, L. S., J. M. Norris, D. E. White, and N. J. Moules. 2017. "Thematic analysis: Striving to meet the trustworthiness criteria." *International Journal of Qualitative Methods* 16(1): 1–13.

Pocock, J. 2012. "Leaving rates and reasons for leaving in an Engineering faculty in South Africa: A case study." *South African Journal of Science* 108(3–4): 1–8.

Sheppard, C., R. Pillay, C. Madyosi, L. Lwanga, J. de Jager, C. Mapaling, K. Hurter, D. Gradidge, and M. Neale-Shutte. 2019. "Nelson Mandela University: Piloting of an early warning system and student support interventions." Panel Presentation at 2019 Siyaphumelela Conference, June 26, 2019. The Wanderers Club, Johannesburg. https://www.siyaphumelela.org.za/conf/2019/#scroll-tab-2.

Talesnik, D. 2021. "Ungar Uncovers How Kids Find Strength in Stressed Environments. The road to resilience." *NIH Record* May 28. https://nihrecord.nih.gov/2021/05/28/ungar-uncovers-how-kids-find-strength-stressed-environments.

Theron, L. C. 2012. "Resilience research with South African youth: Caveats and ethical complexities." *South African Journal of Psychology* 42(3): 333–345.

Theron, L. C. 2019. "Championing the Resilience of Sub-Saharan Adolescents: Pointers for Psychologists." *South African Journal of Psychology* 49(3): 325–36.

Ungar, M. 2008. "Resilience across cultures." *The British Journal of Social Work* 38(2): 218–235.

Ungar, M. 2011. "The social ecology of resilience: Addressing contextual and cultural ambiguity of a nascent construct." *American Journal of Orthopsychiatry* 81(1): 1–17.

Ungar, M. 2012. "Social ecologies and their contribution to resilience." In *The Social Ecology of Resilience: A Handbook of Theory and Practice*, edited by Michael Ungar, 13–31. Switzerland:

Springer.

Ungar, M. 2015. "Social ecological complexity and resilience processes." *Behavioral and Brain Sciences* 38: E124.

Ungar, M. 2018. "Systemic resilience: Principles and processes for a science of change in contexts of adversity." *Ecology and Society* 23(4): 1–17.

Ungar, M., M. Brown, L. Liebenberg, R. Othman, W. M. Kwong, M. Armstrong, and J. Gilgun. 2007. "Unique pathways to resilience across cultures." *Adolescence* 42(166): 287–310.

Van Breda, A. D. 2018. "A critical review of resilience theory and its relevance for social work." *Social Work (Maatskaplike Werk)* 54(1): 1–18.

Van der Merwe, A. J. and B. T. Maharaj. 2018. "Factors affecting engineering student success: A South African perspective." In *2018 World Engineering Education Forum – Global Deans Council (WEEF-GEDC)*, 1–5.

Van Rensburg, A. C., L. C. Theron, and S. Rothmann. 2018. "Adolescent perceptions of resilience promoting resources: The South African Pathways to Resilience Study." *South African Journal of Psychology* 48(1): 73–85.

Van Wyk, M., H. D. Mason, B. J. van Wyk, T. K. Phillips, and P. E. van der Walt. 2022. "The relationship between resilience and student success among a sample of South African engineering students." *Cogent Psychology* 9(1): 1–18.