Studying engineering is tough: Six insights to help university students succeed

January 9 2024, by Curwyn Mapaling

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Engineering courses are a popular choice among South African university students. But these courses are also grueling, and the attrition rates are high. The Council on Higher Education reports that half of the

engineering students enrolled at South African universities [do not complete their studies](). That figure [is similar]() in other parts of the world.

Yet, some students weather the storms of an engineering degree with remarkable [resilience](), ensuring not just survival but success. How do they do it? I am a senior lecturer and trained academic advisor registered as a clinical psychologist with a primary focus on well-being in the [higher education]() sector. [For my Ph.D.]() I examined engineering students' experiences at one South African university to try to answer this question.

The study is particularly timely given the introduction, in 2017, of the [Bachelor of Engineering Technology (BEngTech) degree](). It replaced the National Diploma in Engineering. The BEngTech degree is more academically centered than its predecessor. It requires less practical in-service and work-integrated learning in industry, and is designed to better prepare students for postgraduate degrees in engineering. The shift is designed to raise academic standards and align South African qualifications with global benchmarks. This may make things even tougher for students.

My research delved into what's known as academic resilience. With my supervisors, I defined this as accomplishing academic success in the face of academic challenges. Six key themes emerged. Understanding the dynamics of each theme will help universities to develop strategies for [student]() support. This is especially crucial for courses with high drop-out rates like engineering.

Key themes

As my research took place during the COVID pandemic, all my interviews were conducted online. I interviewed 13 final-year engineering students, six lecturers and six support staff from one

institution. A separate group of 66 final-year students participated in the study by completing a series of four standardized psychometric instruments.

Six key themes emerged.

1. Personal character strengths and well-being. This theme emphasizes the importance of internal qualities like hope, gratitude, spirituality, forgiveness, persistence, and perseverance. These are critical in overcoming academic challenges. For instance one participant, Lucien, told me he hoped to get a better job through further study. Another, Jack, was grateful for the effort he himself had put into his studies.

This finding challenges the traditional focus in research about academic resilience on socio-ecological factors alone. It highlights the significance of individual character in forming resilience.

2. Enabling vs. constraining factors. This theme explores the dual nature of factors influencing academic resilience. On one hand, the ability to reflect, seek help, and persevere enabled students to overcome academic challenges. This was evidenced by students attending additional support programs and workshops. On the other, students faced adversities like adapting to new countries, language barriers, and personal commitments, which hindered their academic journey.

Students had a more positive outlook on their ability to grow and overcome challenges than staff did. This discrepancy in perceptions highlights the need for tailored support systems that acknowledge both the struggles and the strengths of students in their academic pursuits.

3. Relational and socio-ecological support. The study showed that university-provided support, like curricular and extra-curricular

workshops, reduced psychological distress and promoted a sense of belonging. However, both students and staff thought that more personalized support was needed to cater to students' unique circumstances and availability. Both groups recognized that the earlier appropriate and personalized support systems are introduced by the institution, the higher the likelihood of students' academic resilience. Timely, tailored support is crucial in nurturing student success and resilience.

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4. The transition to university. The transition to university, predominantly from school but with an increasing number from the working world, represents a critical period for developing resilience. Orientation programs and support workshops were found to play a significant role in building resilience, especially for students new to the university environment.

I also found that younger students might adapt more easily than older students, suggesting a need for varied support approaches based on age groups. Moreover, students' past experiences, such as previous work or educational transitions, contributed to a smoother adaptation to university life, emphasizing the value of drawing on past experiences for future success.

5. A sense of belonging **and social connection.** This theme aligns with the African philosophy of ubuntu, emphasizing relational resilience.

Students who felt a strong sense of belonging were more motivated and likely to succeed academically. It was clear that resilient students often forged empowering connections, helping them to overcome academic challenges. However, it's important to note that the study may reflect a bias towards students who are adept at forming social bonds; further research may be needed to explore the experiences of those less skilled in this area.

6. [Assistance and resources](link): Access to adequate resources, including food [support](link), specialized facilities, and relational networks, is essential for student success. The study found that students utilizing resources such as initiatives providing free daily meals to under-resourced students showed better academic performance. This underscores the importance of addressing students' basic needs.

Real-world implications

My hope is that these findings might guide institutions to better equip their students with the necessary tools to promote resilience. It's important that such strategies acknowledge both the struggles and the strengths of students in their academic pursuits.

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Citation: Studying engineering is tough: Six insights to help university students succeed (2024, January 9) retrieved 28 April 2024 from https://phys.org/news/2024-01-tough-insights-university-students-succeed.html