Why do people decide to study engineering?

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The need for economic reward and competitive advantage is fuelling technological change. A key component to enable this change is engineering. Currently, the work in progress nationally that requires the services of engineers outweighs the engineers available to perform the work. Even though the Engineering Council of South Africa (ECSA) aims to produce 15 000 engineers per year by 2014, it remains a challenge to attract young people to a career in engineering.

Understanding what influences individuals to pursue a career in engineering should help the local industry to create greater interest in engineering, and if constraining factors can be identified, the problem can be addressed more easily. Local engineers roughly service 100 times the amount of people that need to be serviced by engineers in developed countries such as the United Kingdom.

A master's study aimed at determining the factors that influence people to become engineers, has been conducted in the University of Pretoria's Graduate School of Technology Management. The study firstly examined the different factors that influence an individual's career choice and, secondly, discussed the results that were obtained during a survey among engineering students at the University of Pretoria and Stellenbosch University.

Two statistically significant factors emerged, namely career focus and social environment. In addition, demographic differences between age and ethnic groups were explored.

Three social cognitive variables, namely self-efficacy, outcome expectations and personal goals are used to determine how individuals manage their own academic and career behaviour. The more capable people judge themselves to be, the greater the variety of careers they will consider and the better they will prepare themselves to pursue those careers. Self-efficacy refers to people's judgments of their own capabilities to organise and execute courses of action required to attain designated types of performances.

Interests grow out of areas that individuals believe they can perform in effectively, and these interests usually start to develop during high school. An individual's interests will also influence his or her career choice.

Outcome expectation refers to what an individual anticipates when he or she shows certain behaviour. Some believe that engineers have a high expectancy of obtaining highly valued outcomes such as financial reward and upward movement within the organisation early in their careers. People will develop a lasting interest in a career if they consider that the career will lead to valued outcome expectations and if they have the self-belief in their skills and competency.

Figure 1 illustrates that what people think and feel will influence how they behave, and the outcome of their actions will have an effect on their thought processes and emotions. The section in Figure 1 between "environment" and "person" refers to the interactive relationship between the individual's environment and his or her personal characteristics.

Due to the bidirectionality of influence between behaviour and environmental circumstances, people are both products and producers of their environment. Support from parents for their child's academic and career endeavours, which has been shown to predict a child's career development, positively affects the school engagement of an individual and completion of homework.

Support from friends has shown to improve persistence. Students who experience a supportive environment will most likely consider a wider range of careers, and possibly more challenging ones. Various social barriers have been identified, including pressure from parents to choose a different career, as well as social and economic factors.

In terms of the survey, a significant difference was found between the two groups (18–19 and 20 and older) with regard to social environment, with the older group being less affected by social environment in their career

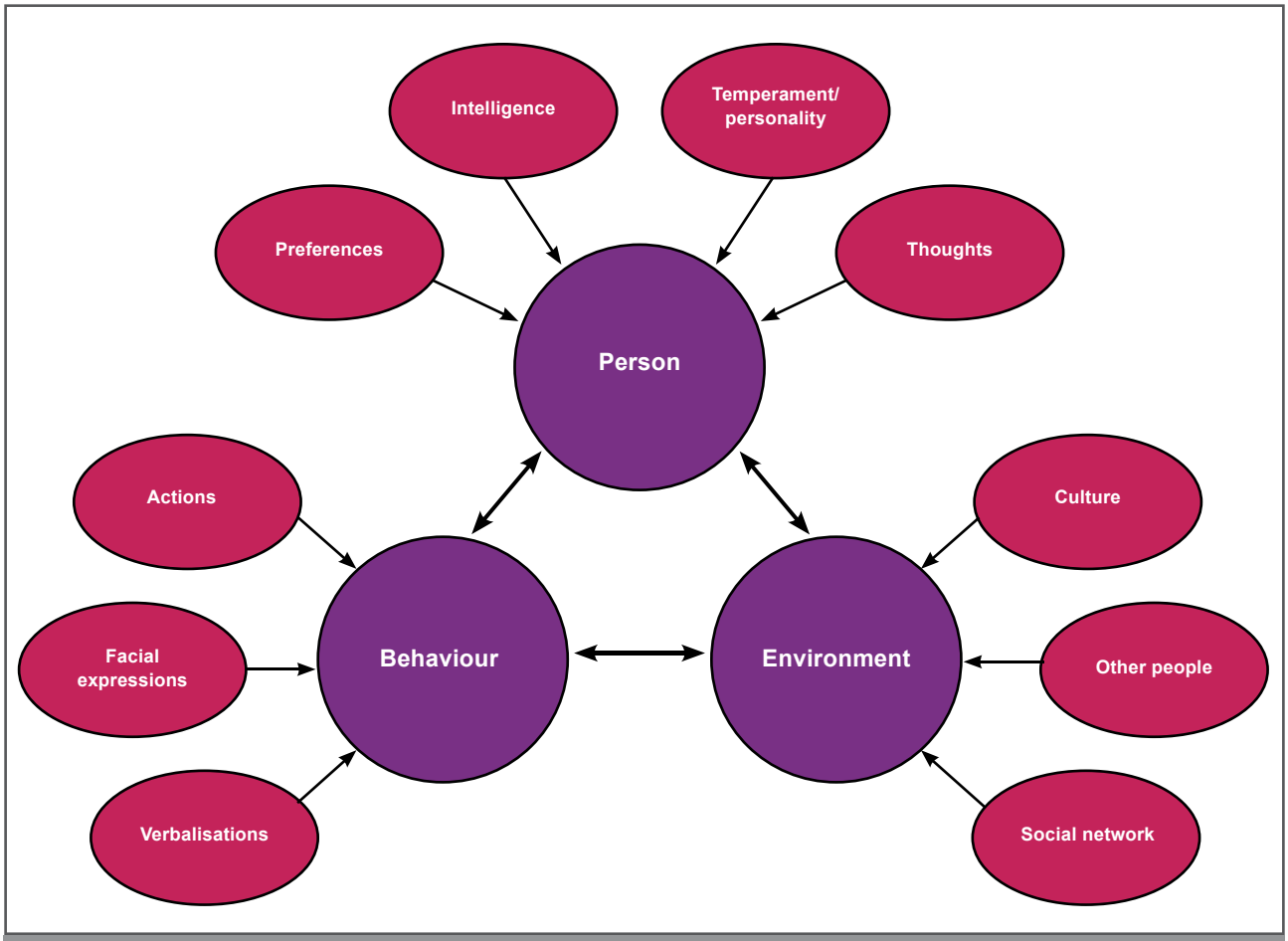

Figure 1: Bidirectional causation (adapted)

choice. This might be because older students are less dependent on their friends and family for support throughout their studies.

There was a significant difference between black and white participants with regard to career focus. Career focus, as part of career decision-making, was more important for black participants than for their white counterparts. This is an interesting finding and counter-intuitive, as differences in social environment would have been expected, given the historical background of our country and the schooling system.

Some institutions, like the University of Pretoria, choose to host a Faculty Day in an attempt to show prospective engineering students what it means to become an engineer. However, less than 40% of the students who participated in the survey indicated that this day had a positive impact on their career choice.

ECSA's awareness campaign (Enginius) would seemingly be more effective if it involved engineering professionals, as nearly two thirds of the research participants indicated that engineering professionals had a positive impact on their career choice, compared to the positive impact that the campaign had on only 15% of the research population.

The surveyed students felt that enjoying the profession, solving real-world issues and being granted the opportunity to be creative in a profession were factors that contributed to their decisions to become engineers (see Figure 2).

Figure 3 shows that the respondents' friends had less of an impact on the individual's career choice than was expected. The question remains whether this was due to the respondent making his or her own career choice, or whether the perception was created that "friends" tried to persuade the individual to study towards a different career. Research has shown that professions such as medicine and law usually hold the greatest social status. It seems that, within the South African context, engineering generally has a great enough social status to draw people to the profession.

Engineering professionals have a significant impact on the career choices of many current engineering students. It might attract a lot of interest if current engineering professionals got involved in promoting engineering as a career to prospective students. One such option would be if current professionals could hold a road show, explaining what the career is about and making some more concepts tangible to prospective students.

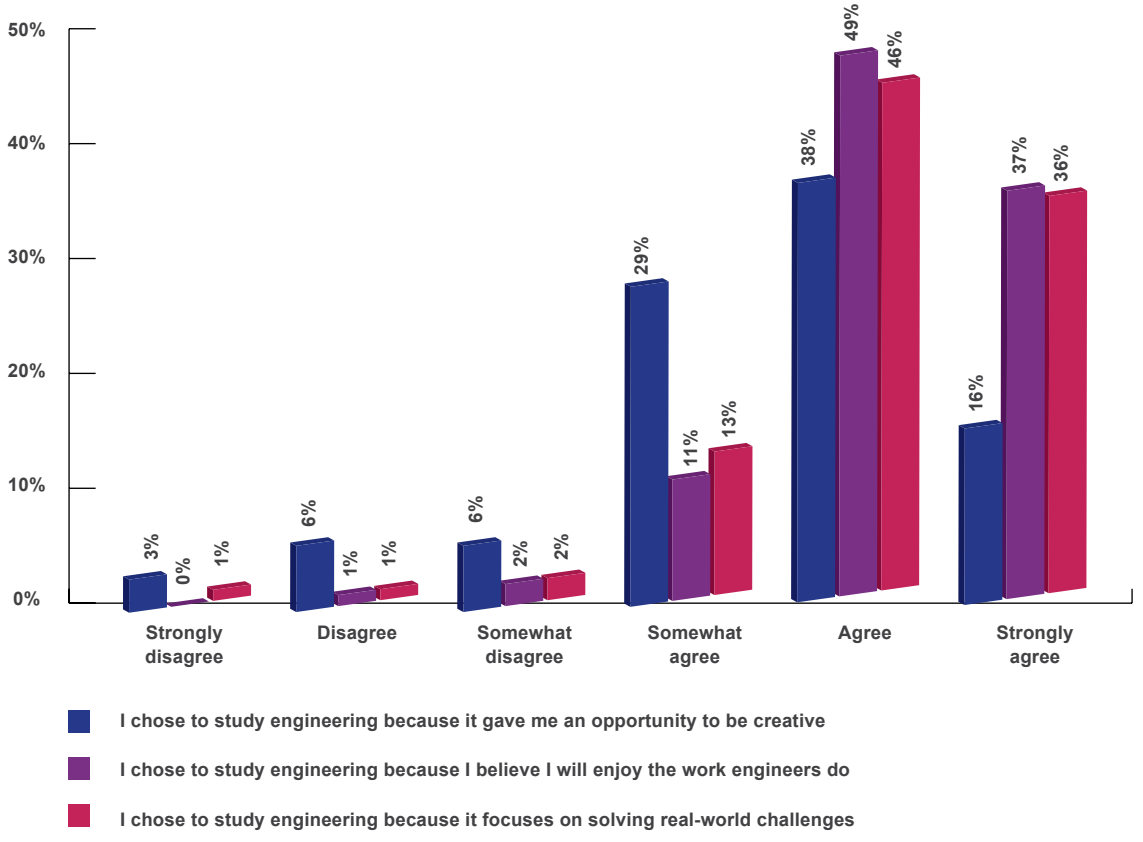

Figure 2: Data captured relating to career focus

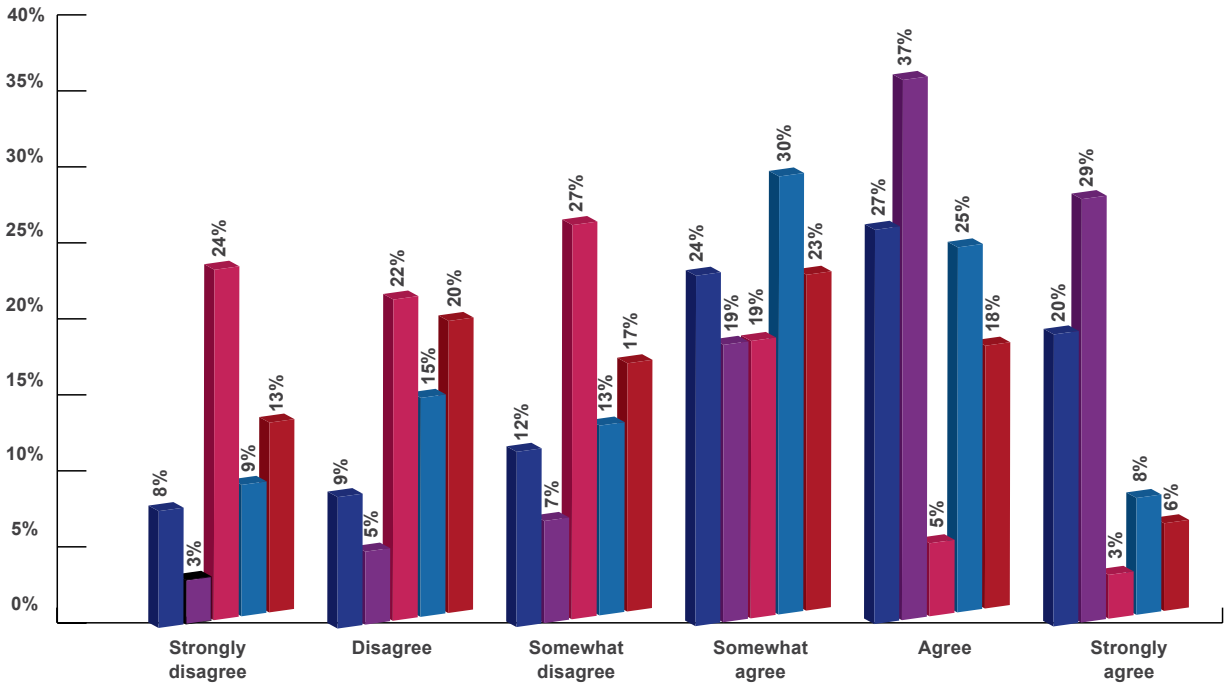

Figure 3: Data relating to social support and barriers