EngineeringUK

Educational pathways: Harnessing the talent pool

Findings from the Engineering Brand Monitor 2021

December 2022

Contents

Key findings

1. Young people between the ages of 11 to 14 years had the greatest interest in engineering (55.3%), they were also the group that indicated they had the least knowledge (52.6%), compared with older young people.

2. Females, compared with males, indicated they were less knowledgeable (48.4% vs 61.3%) and less interested (38.5% vs 62.5%) in engineering among all age groups.

3. 65% of males between the ages of 14 to 16 indicated they know what engineers do and are interested in a career in engineering. They are also the largest group to indicate they know the educational pathways into engineering (51.5%).

4. Females indicated they were less knowledgeable about educational pathways into engineering than boys across all age groups. Their reported knowledge was at least 10 percentage points lower across age groups than that of males.

5. Parents are the largest single source of careers advice for young people (52.8%).

6. Parents generally perceive engineering as a well-respected profession (83.2%), although only a little more than half (56.1%) report to have knowledge of what engineers do.

7. The social grade of parents has a large influence on their perception, knowledge, and likelihood of recommending engineering to their child/children.

8. STEM teachers generally know what engineers do (81%) and are confident giving careers advice about engineering (72%).

1. Introduction

For more than 20 years, EngineeringUK have undertaken comprehensive research into the state of engineering in the UK, including the extent to which the supply through education and training pathways is likely to meet future needs and demand for engineering skills. This flagship research, once produced as a single report, is now available in a range of formats, providing the most up-to-date analysis. This briefing is part of our educational pathways series and is accompanied by a suite of data tables.

This briefing focuses on the perception, knowledge and interest in engineering amongst young people, their parents, and teachers. This will give a better understanding of the opportunities and potential barriers faced in ensuring there are more young people interested in pursuing a career in engineering.

Understanding the perception and knowledge of engineering is an important first step in interpreting what might need to change to ensure the engineering sector is recruiting from the full breadth of the talent pool. It is important to recognise the thoughts of young people when trying to ensure engineering is a viable option as a career. Personal perception, knowledge and educational choice all have an impact on whether a young person will consider pursuing engineering as a career. If a young person doesn't feel capable to choose a STEM (science, technology, engineering and maths) pathway, they are unlikely to go on to work in engineering.

It is also important to understand the perception and knowledge of engineering careers and pathways by gender, ethnicity and economic background. If we want a more diverse workforce which is representative of modern Britain, then it's important to know if there are any gaps in knowledge or desirability based on these characteristics. This will ensure the sector is tapping into the entire talent pool.

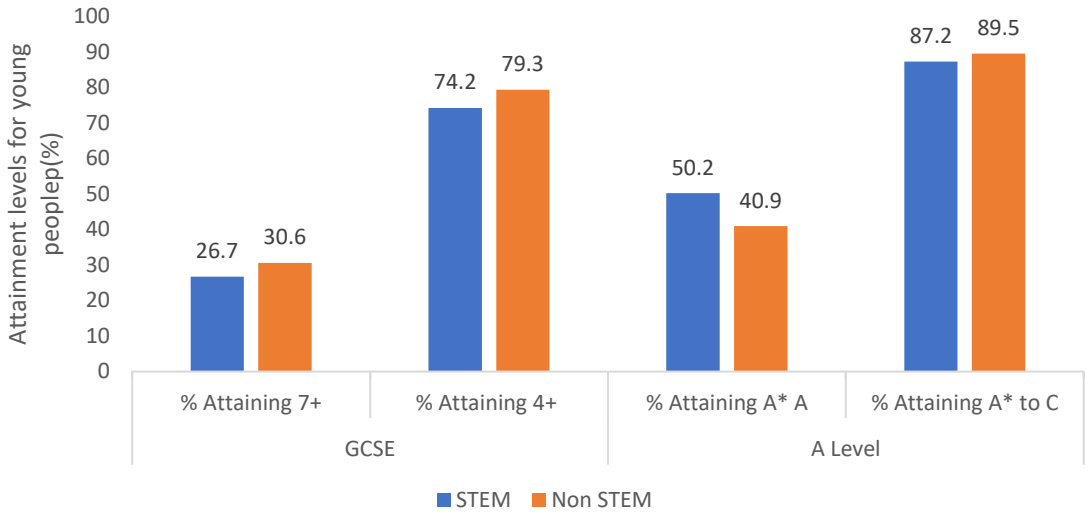
Parental and teacher perceptions and support, careers provision, and access to STEM engagement both in and out of school all have an impact on young people's knowledge and perceptions of engineering. These impact the subject choices at GCSE and A level or further education study, which in turn impacts progression into studying and working in engineering.

The data in this briefing is taken from our Engineering Brand Monitoring survey, which was run in 2021. Over 4,000 young people aged 7 to 19 and their parents, as well as over 500 teachers across the UK were surveyed. This briefing focuses on the responses of young people aged 11 to 19, their parents and teachers.

2. Educational outcomes

Looking at the educational outcomes for young people in STEM subjects in England, Wales and Northern Ireland in 2021, the proportion of young people attaining a 4+ or 7+ at GCSE is below other, non-STEM, subjects. While there has been a disjointed nature to the school years over the past year or two and differences in assessment, this is a trend seen over many years. If a young person fared worse in STEM subjects (compared with non-STEM subjects), they are unlikely to pursue those subjects at A level and beyond. Higher attainment levels in STEM A level compared to GCSEs suggest those who perform better at GCSE are going on to study at A level.

Figure 1 - Average GCSE and A level attainment in STEM and non-STEM subjects (England, Wales and Northern Ireland combined) (2020/21)



Source: JCQ. 'GCSE (Full Course) Results, Summer 2021' data, 2021. - Figure 1.1 - Excel resource

Young people are on average attaining higher in non-STEM subjects at GCSE for both the 7+ and 4+ measure. At A level there are a higher proportion attaining A or above in STEM than in non-STEM subjects.

Nearly 40%[1] of people working in engineering are educated to degree level, with the majority of these people having a first-degree subject matter of STEM.[2] If a young person leaves STEM education at GCSE, they are unlikely to go on to study STEM at degree level. Interventions therefore need to take place long before GCSE or post-16 study.

[1] ONS Labour Force Survey, 2021
[2] ONS quarterly Labour Force Survey, 2019

3. Knowledge and interest in engineering – by age and gender

Looking at the interest and knowledge of careers in engineering amongst young people, the group with the greatest interest, 11- to 14-year-olds, are also the group that have the lowest knowledge. This group is key for targeting and engagement, as they are yet to have made any decisions about subjects they will continue studying. The gender disparity is stark already at this age, with girls generally being less interested and less knowledgeable in engineering than boys. If the sector is to ensure the workforce moving forward is more representative and that the engineering sector taps into the whole talent pool, then focus needs to be put on boosting knowledge and desirability of engineering with girls to bring them in line with boys.

Table 1 - Knowledge and interest of engineering careers among 11- to 19-year-olds by age group and gender

	Gender	Age 11 to 14	Age 14 to 16	Age 16 to 19	All ages (age 11 to 19)
Know what engineers do (%)	Male	59.4	65.4	59.9	61.3
	Female	45.6	46.1	54	48.4
	Overall	52.6	56.9	57.1	55.2
Interested in an engineering career (%)	Male	69.5	65	52.2	62.5
	Female	41.6	35.2	37	38.5
	Overall	55.3	51.6	45.2	51

Overall, knowledge and interest in engineering as a career is quite heavily split along gender lines in favour of boys. There are also some differences based on the age of young people, with the younger age groups generally being more interested than older groups.

- The proportion of girls responding that they are interested in a career in engineering is below boys for every age group.
- The proportion of girls responding that they feel they know about careers in engineering is below boys in every age group.
- The greatest gap between boys and girls for both knowledge and interest is in the 14 to 16 years old age group, with interest being the most significantly different.

4. Knowledge and interest in engineering – by ethnicity

There are also differences in knowledge and interest in engineering by ethnicity. There is a greater knowledge and interest amongst young people of Asian or Asian British backgrounds, with two thirds of this group indicating they know what engineers do and stated they were interested in an engineering career. The lowest rate of knowledge and interest in engineering is amongst young people of mixed ethnicity narrowly followed by young people of white ethnicity.

Table 2 - Knowledge and interest of engineering careers among 11- to 19-year-olds by ethnicity

	Asian or Asian British	Black or Black British	Mixed	White	Other ethnic group	Prefer not to say
Know what Engineers do (%)	67	58.2	49	54.4	79.9	60.9
Interested in an engineering career (%)	66.8	54.3	50.9	49.5	73.3	62

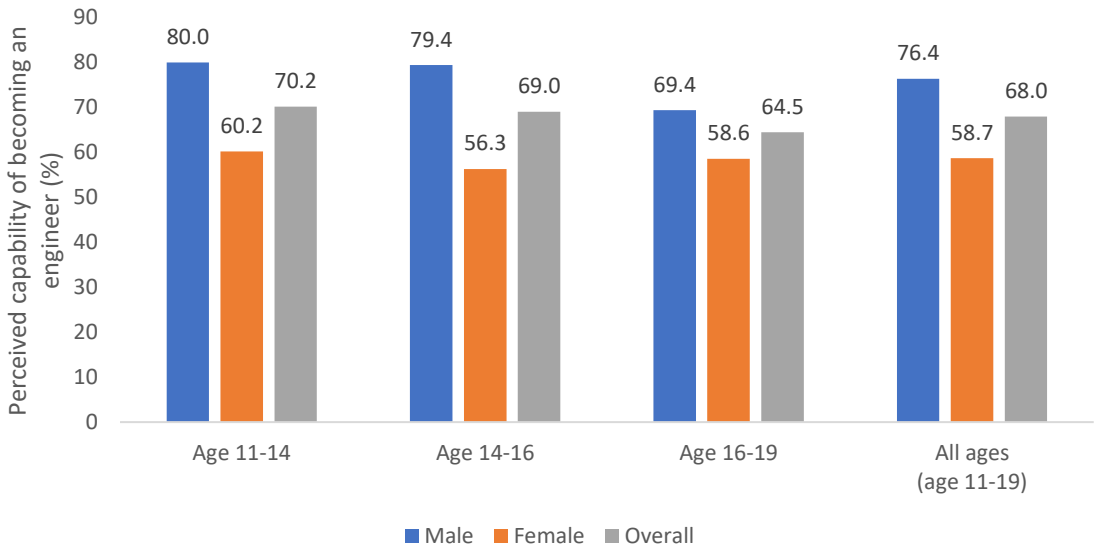
Engineering perception and knowledge amongst young people

A key part in a decision for pursuing a career in engineering is the perceived capability of a young person to pursue such a career. There will be several elements which influence young people's perception. Beyond the obvious academic abilities, to enjoyment of STEM subjects at school and their knowledge of future pathways. There are also the perceptions beyond the classroom of engineering more widely which are likely to come to play.

Just over two thirds of young people said they believed they could become an engineer. Those between the ages of 16 to 19 are the least likely to say they could become an engineer, which could be partially explained by this group having already selected their further education or A level study. It is reassuring that the young people in the 11 to 14 age group are more confident in their capabilities, further highlighting why this group are essential to target.

Girls overwhelmingly are less confident in their capabilities of becoming an engineer than boys. Girls are more likely to outperform boys in STEM subjects at both GCSE and A level. Therefore, there isn't an academic barrier to girls pursuing a career in engineering, so the barrier must exist in perception, knowledge and wider societal factors.

Figure 2 - Engineering self-efficacy among 11- to 19-year-olds by age group and gender



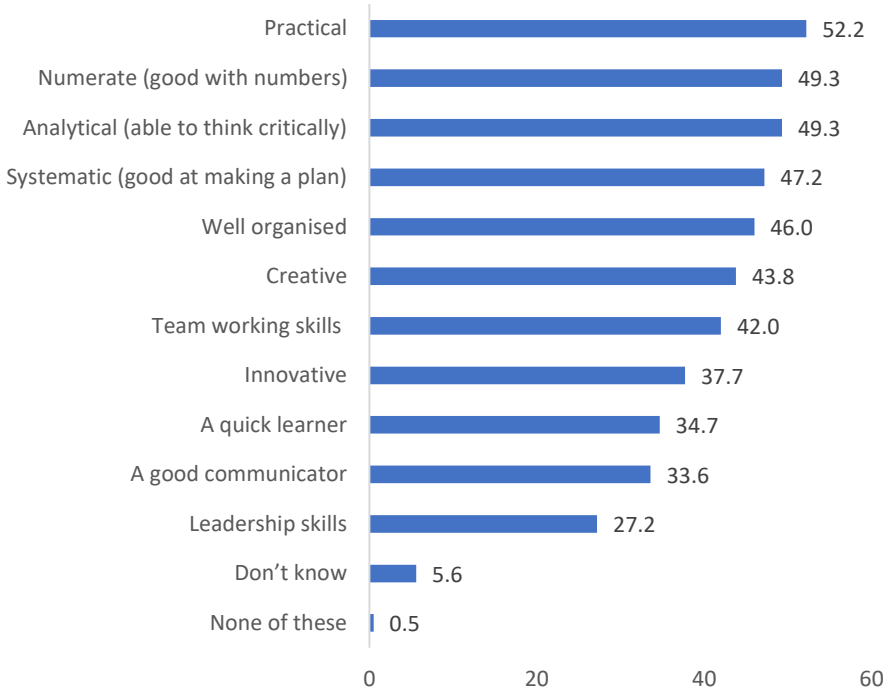
Source: EngineeringUK. 'Engineering Brand Monitor' data, 2021. – Figure 1.6 – Excel resource

Overall, the proportions stating they could become an engineer is impacted both by gender and age. The gender imbalance has implications for the appeal of an engineering career amongst girls.

- Perceived ability to become an engineer declines with age, with 11 to 14 year olds being the most likely to believe they could become an engineer, and 16 to 19 year olds the least.
- Girls have less confidence in their perceived capabilities of becoming an engineer.

A wide range of skills and characteristics are needed to become an engineer, but these are not always well-understood by young people. Figure 3 (below) indicates what characteristics young people believe engineers need to do their job well.

Figure 3 - Perceptions of the characteristics engineers need to have to do their job well among 11 to 19 year olds



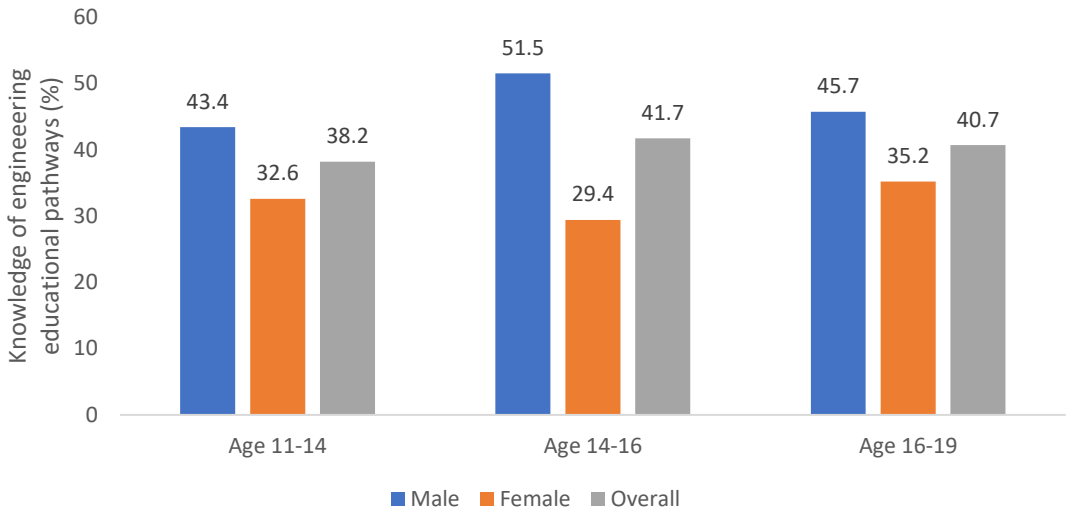
Source: EngineeringUK. 'Engineering Brand Monitor' data, 2021. - Figure 1.5 - Excel resource

Young people's knowledge of skills needed by engineers is not particularly comprehensive and indicates some knowledge gaps. The only characteristic selected by more than half of young people was 'practical'. 'Numerate', 'analytical' and 'systematic' were the next most selected characteristics. The responses give an indication that young people are not aware of the breadth of characteristics needed in the engineering profession.

5. Knowledge of education and pathways

There are numerous educational pathways into engineering, so it is important that young people understand the options available to them. Improved knowledge of both academic and vocational routes can also help with improving the diversity of the sector. Figure 4 (below) shows young people's knowledge of the qualifications or subjects they would need to take to work in engineering.

Figure 4 - Knowledge of engineering educational pathways among 11- to 19-year-olds by age group and gender



Source: EngineeringUK. 'Engineering Brand Monitor' data, 2021. - Figure 1.8 - Excel resource

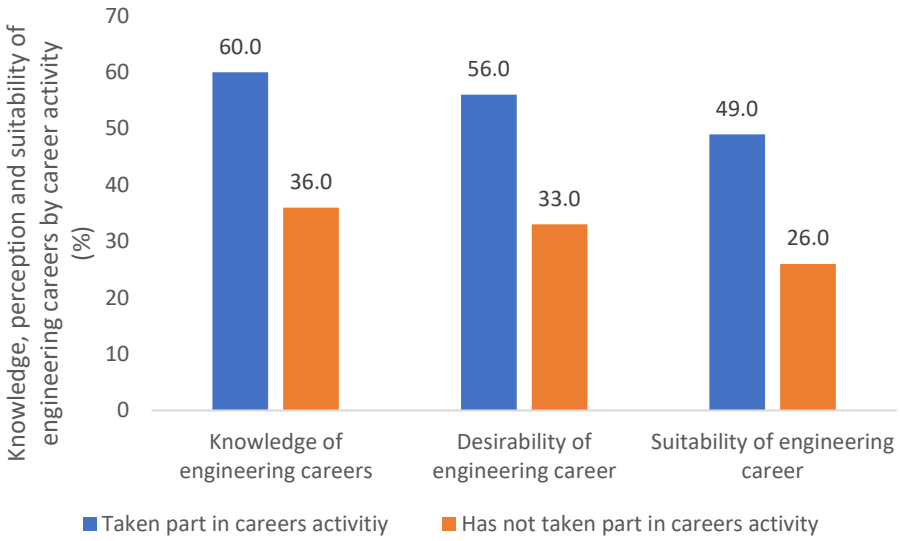
Over half of young people are unaware of what subjects or qualifications they would need to take in order to pursue a career in engineering in the future. The knowledge of this by girls is particularly low, with over two thirds unaware of which qualifications they would need to pursue an engineering career.

- The proportion of young people responding that they knew which qualifications/ subjects they would need to pursue a career in engineering is around 40% for every age group.
- Boys are generally more knowledgeable of qualifications/subjects that would be necessary to pursue an engineering career than girls. Although, there is still only one age group (14 to 16) where more than half of boys say they know what they would need to do.
- Only around a third of girls know which qualification/subjects they would need to attain to pursue an engineering career.

General knowledge of engineering educational pathways is low for both boys and girls and needs to be much higher across the board. As previously stated, if there is a lack of engagement in STEM education beyond compulsory subjects at GCSE, and particularly at A level, there is a loss of potential future engineers. The responses broken down by ethnicity show that no significant differences exist between the different ethnic groups.

Participating in careers activities is a key way a young person is informed about potential career pathways. Figure 5 highlights the difference taking part in careers activities makes on young people's knowledge, perception and self-perceived suitability to a career in engineering.

Figure 5 - Knowledge, perception and suitability of engineering careers by careers activity.



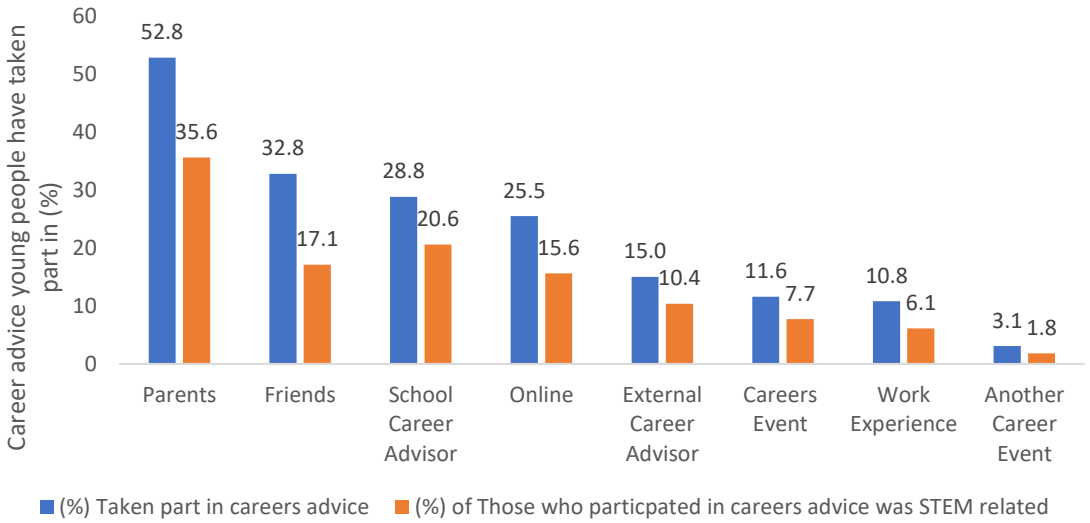
Source – EngineeringUK Engineering Brand Monitor 2021 – Figure 1.16 – Excel resource

Overall, there are some clear connections between knowledge, desirability of engineering careers by participation of careers activity. Young people who have taken part in some careers activity, are more likely to be knowledgeable of engineering, see it as more desirable and would see it as a suitable career path, than if they hadn't taken part in any careers activity.

6. Parental knowledge of engineering and STEM educational pathways

Young people say that their main source of career advice is their parents. They are also the main sources of advice for educational pathways outside of school. Figure 6 shows the percentage of young people who received career advice from different sources and the proportion of those who said the advice was related to STEM.

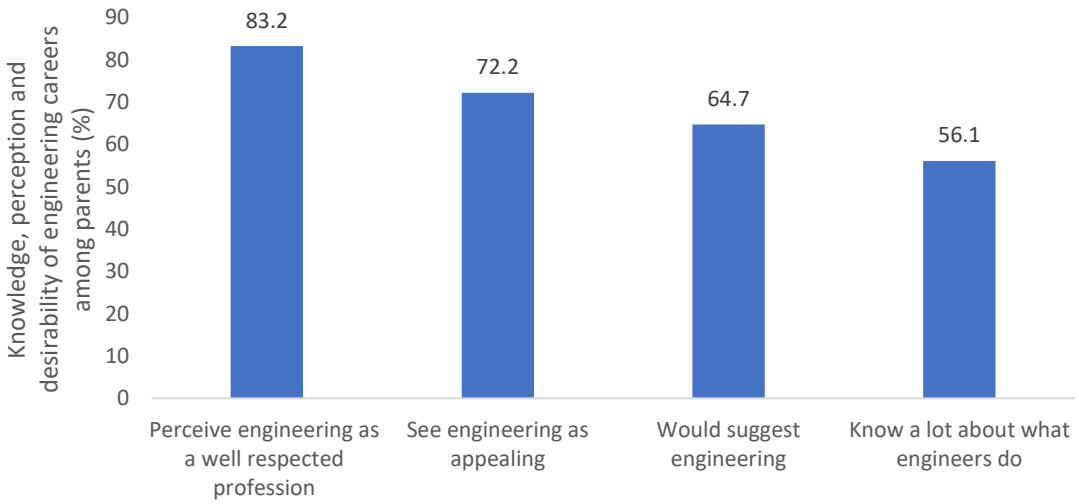
Figure 6 - Source of careers advice and the proportion of that which is STEM related



Source: EngineeringUK. 'Engineering Brand Monitor' data, 2021. - Figure 1.10 - Excel resource

Although over 50% of young people said they had received careers advice from parents, only around a third said it was STEM related. The actual numbers of young people indicating that they had received careers advice is quite small, becoming even smaller when asked if it was STEM related. External career advisors, careers events and work experience were all highly impacted by the pandemic.

Figure 7 - Knowledge, perception and desirability of engineering careers amongst parents



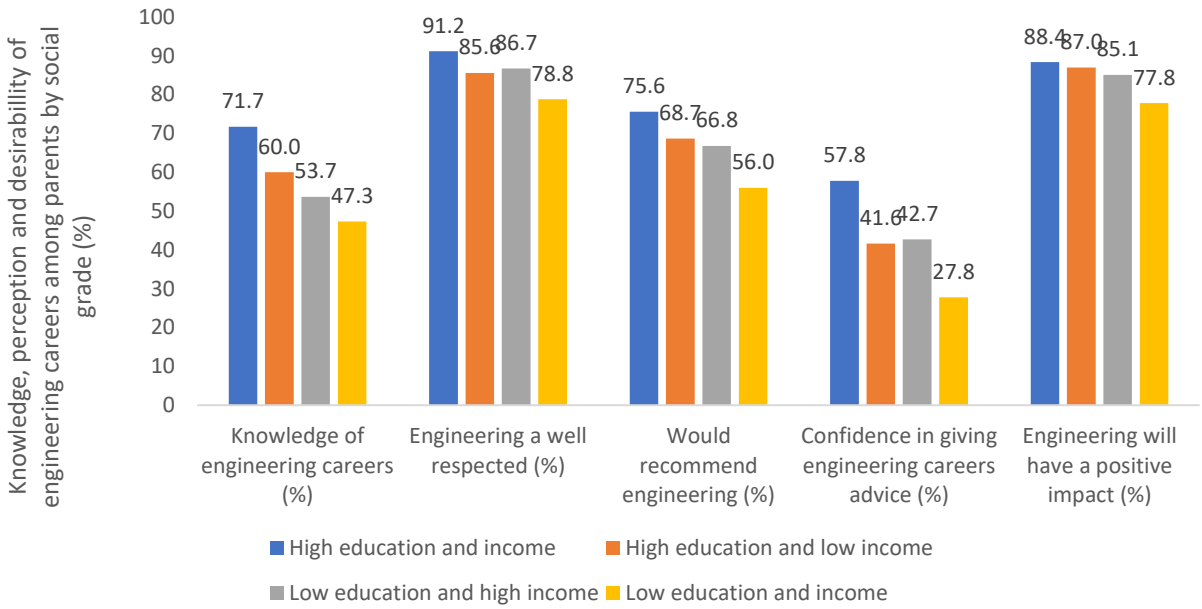
Source: EngineeringUK. 'Engineering Brand Monitor' data, 2021. - Figure 1.11 - Excel resource

Perceptions and knowledge amongst parents is important to understand the influence they can impart on young people. As seen in figure 6, parents are major source of careers advice.

- 83.2% of parents see engineering as a well-respected profession, and 72.2% said that they see engineering as an appealing career.
- Parental knowledge of what engineers do is only slightly higher than that of young people. 56.1% of parents said that they know a lot about what engineers do, while 55.2% of young people said the same.
- Two thirds (64.7%) would suggest engineering as a career for their children.

Understanding the connection between social grade of parents and their knowledge, perception and desirability of engineering careers, could help to explain why some groups are underrepresented.

Figure 8 - Knowledge, perception and desirability of engineering careers amongst parents by social grade



Source: EngineeringUK. 'Engineering Brand Monitor' data, 2021. - Figure 1.13 - Excel Resource - Includes definition of social grades

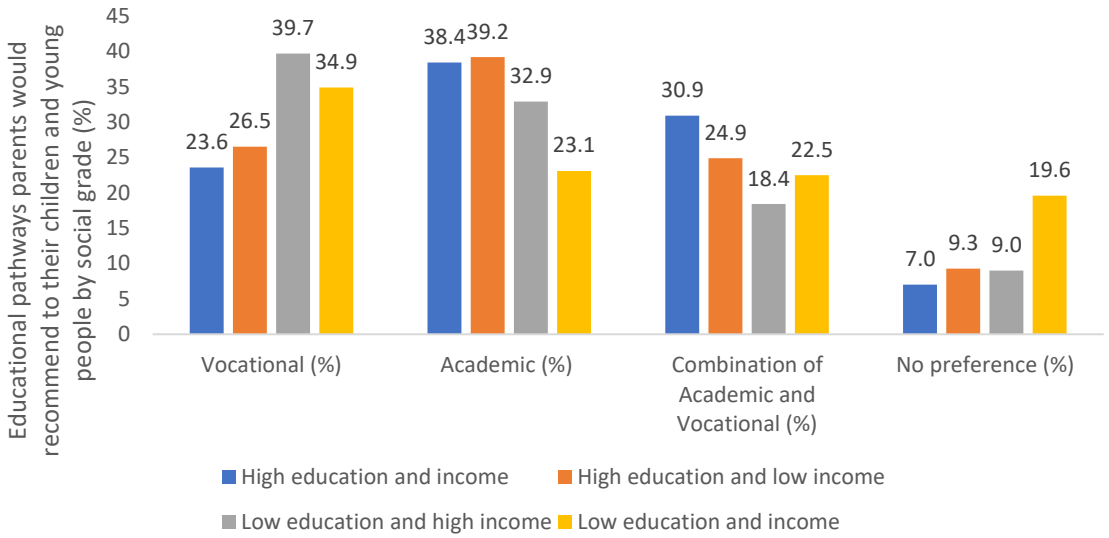
When breaking down the knowledge, perception and desirability of engineering careers by the social grade of parents, parents with high level of education and high income are more knowledgeable about engineering careers and more likely to see engineering in a positive light. A higher proportion of those parents would also recommend engineering as a career path than others.

Parents with a lower education level and income level were least knowledgeable about engineering, although the vast majority still saw the profession in a positive light. Although, just over half responded that they would recommend engineering as a career (the lowest) and less than a third said they felt confident in giving advice to follow the career.

Parents generally do agree that engineering is a good career, however they might not be able to offer their children and young people the necessary encouragement to pursue such a career. Parents are not trained careers advisors and might not have the necessary skills to recommend specific career and educational choices to young people. This could also be said for career pathways outside of engineering too.

Educational pathway advice from parents is important, as evidenced in figure 6, parents play a significant role in advising young people on pathways into careers. Looking at the educational routes to engineering recommended by parents based on their social grade, there is a large divide based on parental education.

Figure 9 - Educational pathways into engineering that parents would recommend by social grade



Source: EngineeringUK. 'Engineering Brand Monitor' data, 2021. - Figure 1.12 - Excel Resource - includes definition of social groups

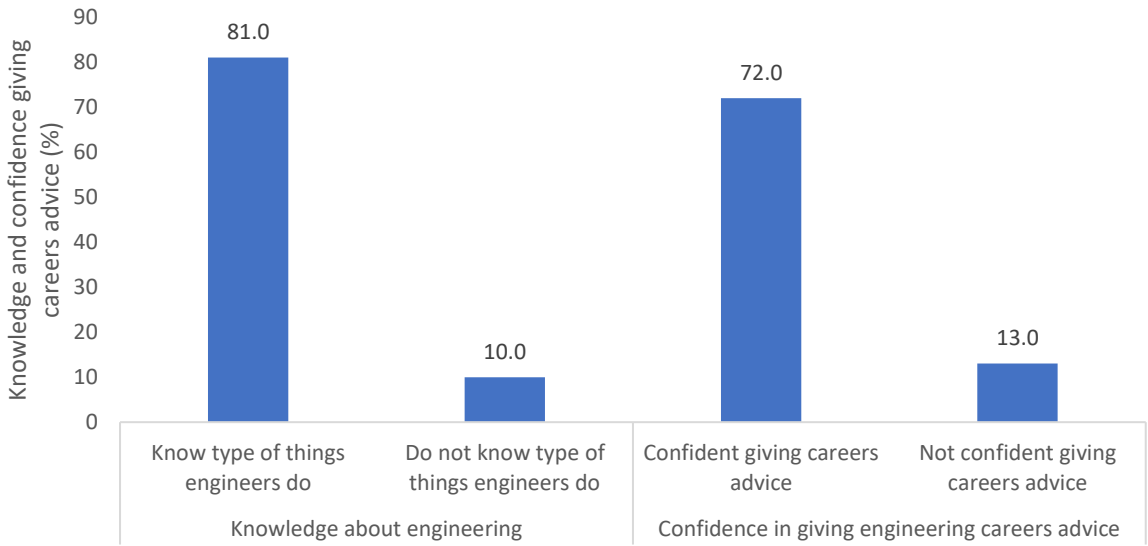
Parents with a higher level of education are more likely to recommend an academic route to their children and young people, regardless of income level, while parents with a lower level of education are more likely to recommend a vocational route regardless of income level.

Parents with low education level and low income level were more likely to have no preference as to the educational route of their child. This could also come down to confidence in offering such advice as seen with their confidence in giving engineering careers advice in figure 8.

7. Secondary STEM teachers' perception and knowledge of engineering

Schools, and STEM teachers in particular, play an important role in advising young people about engineering careers. STEM teachers are important in shaping the enjoyment and engagement of STEM in the classroom, and their knowledge and understanding of the engineering industry is an important resource outside of the classroom.

Figure 10 - Knowledge and confidence giving careers advice to young people by STEM secondary school teachers



Source: EngineeringUK. 'Engineering Brand Monitor' data, 2021. - Figure 1.15 - Excel resource

The majority of teachers said they know a lot about engineering, while 72% said they were confident giving careers advice relating to engineering to their pupils. This indicates that the knowledge base amongst teachers to engage and advise young people about careers in engineering is there. Teachers are an important resource in ensuring, not only that more young are interested in STEM educationally, but also interested in engineering professionally.

To ensure the engineering community is effectively harnessing the talent pool, it is necessary to create greater engagement and understanding with young people, not only about engineering as a career, but also educational pathways from an early an age as possible. The need to engage all sources of careers activity from parents, STEM teachers and careers advisors is essential to ensure all young people feel capable of pursuing careers in engineering.

8. Further information

For further information about 'harnessing the talent pool' and the views of young people on engineering please see Chapter 1 of the 'Educational pathways into engineering' report (2020) and the engineering brand monitoring report (2021) on the EngineeringUK website.