Queen Elizabeth Prize for Engineering Report

CREATE THE FUTURE 16-17 YEAR OLDS

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Queen Elizabeth Prize for Engineering Report

INTRODUCTION

he Queen Elizabeth Prize for Engineering celebrates the very best feats of engineering and the engineers who make these feats possible. By sharing international successes and rewarding pioneering innovations that are of global benefit to humanity, the QEPrize seeks to inspire the next generation of innovators, creators and leaders.

In the first QEPrize Create the Future Report, released in October 2015, we examined the views of those outside the profession in ten key economies: Brazil, China, Germany, India, Japan, South Africa, South Korea, Turkey, the United Kingdom and the United States.

In this supplement to the report we have focused on the attitudes and perceptions of 16 – 17 year olds across the markets. Within our latest report we see young people around the world are most interested in technology above all of the other STEM subjects. Their interest is underpinned by an understanding that engineering is

behind the latest technological innovations, which were defined as software, apps, websites, social networks, mobile devices and cameras. The challenge for the industry is to convert this understanding of engineering's influence on technology into driving more young people to become engineers and create the next world changing innovations.

The report also highlights young people's desire to contribute to society as being a key driver behind their career choices, over and above career opportunity, income and security and respectability.

These findings show us, and those invested in a bright future for engineering, that we must continue to challenge the perceptions of young people and demonstrate the profession's modernity and innovative endeavours. Engineering needs to share in young people's love of technology and lift the lid on the symbiotic relationship between the two disciplines.

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A. The UK's interest in technology is higher than that of the global average, but the same demographic in the UK showed the least interest in engineering of all the countries surveyed.

A. This is reflected in more established economies showing a lower interest in engineering; the UK scores lowest, while China and India lead the world's youth in considering a career in engineering.

The division between emerged and emerging economies is better understood when analyzing perceptions of engineering amongst 16-17 year olds, with countries such as India, China, South Africa, and Brazil holding engineering as a career in high esteem and the UK, US, Germany and South Korea having slightly lower rates of admiration for the career. Despite this, engineering is considered a fulfilling career by 71% of 16-17 year olds globally, a very respectable career by 71%, and a prestigious career by 67%.

A. Despite their enthusiasm, youth in emerging economies feel there are strong barriers to pursuing it as a career path, namely the perception that an engineering degree is too expensive.

A. However, while united on those three issues, the world's youth find themselves polarised on housing challenges (UK, India, and Brazil peaking on this issue while Germany and Japan are less concerned), infrastructure (a major issue for emerging economies but less so for emerged economies), and food scarcity (a huge concern in India but less of a priority in China).

The role and expectation of 16-17 year olds from engineering is evolving,

world's problems.

A. This is also impacting global youths' motivations for pursuing engineering as a career, with contribution to society trumping career opportunity for 16-17 year olds (compared to the opposite amongst total population).

Globally, 16 -17 year olds showed most interest in Technology, above the other STEM subjects of Science, Mathematics and Engineering.

B. Engineering is seen to be as vital to technological innovations as it is to buildings and transportation.

However, the world's youth is divided when it comes to interest in engineering, both as a topic and a career path, with emerging economies demonstrating greater interest while emerged economies show a lesser interest.

B. Germany is the only emerged economy which sees an increasing interest in engineering amongst its 16-17 year olds.

B. Globally, 4 in 10 16-17 year olds feel engineering degrees can be too hard or challenging, too expensive, and that there is a lack of funding in training for engineering in their countries.

While 16-17 year olds globally are primarily concerned with their future

employment and that of their children (80%), their worries also expand to more conscious issues like global climate change (72%) and depleting energy sources (73%).

> B. 16-17 year olds see engineering as having a role in all of these issues.

with most feeling present day engineering should focus on new innovations but demanding a drastic shift for the future, seeing engineering's role then as solving the

> **B.** This is particularly true for 16-17 year olds in the UK, US, and Japan and less so for Brazil and South Korea.

INTEREST IN STEM AND ENGINEERING AS A CAREER PATH

IN EACH STEM SUBJECT



FIGURE 1

Globally, 16-17 year olds showed most interest in Technology as a subject, above the other STEM subjects of Science, Mathematics and Engineering. The global average for interest in technology was over ten percent higher than science with 82%. Regionally, the UK over indexed in their interest in technology with 85%, however, the UK's interest levels fell below the global average across the other STEM subjects.

% OF 16 - 17 YEAR OLDS WHO ASSOCIATE THE FOLLOWING **INNOVATIONS WITH ENGINEERING**



Global 16-17 year olds UK 16-17 year olds

	Global 16-17 year olds	UK 16-17 year olds
NET Technology	92%	82%
NET Healthcare	87%	92%
NET Agriculture	77%	54%
NET Infrastructure/ buildings	94%	95%
NET Transport	93%	95%

FIGURE 2

Shows the global understanding of engineering and its role in key sectors, such as transport, healthcare, infrastructure, farming and technology. While engineering is traditionally strongly linked to sectors such as infrastructure and transport, 16-17 year olds also strongly associate engineering with technological innovations (92%), such as software, apps, websites, social networks, mobile devices and cameras.



FIGURE 3

Interest across all the STEM subjects is high amongst youths globally; however, interest in engineering varies greatly by country. Emerging economies are generally more interested in engineering, while emerged economies show low interest in the topic. 16-17 year olds in the UK show particularly low interest in engineering, despite a high appreciation of its role within technology, suggesting a link between the two has not been made.

PROPENSITY TO CONSIDER A CAREER IN ENGINEERING AMONGST 16-17 YEAR OLDS



FIGURE 4

The dichotomy between emerging and emerged economies spreads to the proportion of 16-17 year olds from each country who would consider a career in engineering. Once again, despite there being a symbiotic relationship between the disciplines of engineering and technology, young people in the emerged markets do not show a good understanding between it and an engineering career.



FIGURE 5

When 16-17 year olds interest in engineering is compared to that of the rest of their population, 60% of the countries surveyed showed a lower interest rate in engineering; however, a trend amongst emerging economies can be detected indicating that interest in engineering in emerging economies is not only high, but also growing in comparison to older generations. The opposite is true for emerged economies, except in the case of Germany, which defies the trend. German youths' interest in engineering is higher than their elders, unlike the USA, UK, Japan and South Korea.

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RECOGNISING AND UNDERSTANDING ENGINEERING

PERCEPTION OF 16-17 YEAR OLDS TOWARDS ENGINEERING AS A CAREER



FIGURE 6

When investigating perceptions of engineering we are able to shed light on the emerging / emerged economy trends highlighted in the previous section. In Figure 6 above, we see that engineering as a career is held in high esteem in emerging economies, while the admiration slightly lowers in emerged economies. That being said the average perception of the 16-17 year olds is that engineering is a highly respectable, fulfilling and prestigious career.

16-17 YEAR OLDS VIEW OF BARRIERS TO ENGINEERING AS A CAREER



FIGURE 7

Despite the enthusiasm of 16-17 year olds in emerging economies towards pursuing engineering as a career, many feel that qualifications are very difficult to attain, being too hard or too expensive. This perception lowers in emerged economies, with perceptions of costs and difficulty going down.



An engineering degree is too hard or challenging
An engineering degree is too expensive
There is a lack of funding in training for the engineering workforce in my country



FIGURE 8

There is a disconnect between engineering being seen as inspiring young people and global youth having pride in engineering in their country; a large majority of South African 16-17 year olds view engineering as inspiring young people, but only a small proportion view their own country as a leading engineering country (also true for the UK, Turkey, and South Korea), while 16-17 year olds in Japan, Germany, and the US, see their countries as engineering leaders but do not find the field particularly inspiring.



SOLVING THE WORLD'S PROBLEMS



lobally, 16-17 year olds are unanimously concerned about finding a good job (for themselves and their future children). In addition youths all over the world are worried about global issues like climate change, and depleting energy sources.

On the other hand, 16-17 year olds are polarised when it comes to housing challenges (UK, India, and Brazil peaking on this issue while Germany and Japan are less concerned), infrastructure (a major issue for emerging economies but less so for emerged economies), and food scarcity (a huge concern in India but less of a priority in China).

% OF 16-17 YEAR OLDS CONCERNS FOR THE FUTURE

PRIORITIES FOR ALL 16-17 YEAR OLDS IN ALL MARKETS	TOTAL	UK	US	GERMANY	TURKEY	INDIA	CHINA	SOUTH KOREA	JAPAN	SOUTH AFRICA	BRAZIL
Finding a good job (for myself or my future children)	80%	90%	80%	73%	64%	89%	64%	87%	71%	89%	86%
Climate change	72%	72%	63%	70%	62%	84%	62%	79%	68%	82%	75%
Depleting energy sources	73%	64%	66%	74%	59%	89%	52%	84%	61%	86%	85%
POLARISING TOPICS FOR 16-17 YEAR OLDS	TOTAL	UK	US	GERMANY	TURKEY	INDIA	CHINA	SOUTH KOREA	JAPAN	SOUTH AFRICA	BRAZIL
POLARISING TOPICS FOR 16-17 YEAR OLDS Housing challenges	TOTAL 59%	UK 72%	US 51%	GERMANY	TURKEY	INDIA 80%	CHINA 47%	SOUTH KOREA	JAPAN 43%	SOUTH AFRICA 66%	BRAZIL 75%
POLARISING TOPICS FOR 16-17 YEAR OLDS Housing challenges Infrastructure (e.g. roads, plumbing, cities)	TOTAL 59% 57%	UK 72% 36%	US 51% 37%	GERMANY 20% 43%	TURKEY 58% 53%	INDIA 80% 80%	CHINA 47% 44%	SOUTH 67% 55%	JAPAN 43% 51%	SOUTH 66% 87%	BRAZIL 75% 84%

FIGURE 9

When it comes to engineering contributing to helping these issues, opinions vary by country. With regards to improving renewable energy, addressing housing challenges and infrastructure challenges, emerging economies are guite optimistic. Emerged economies are more pessimistic in general, especially concerning the role of engineering in reducing unemployment, and addressing food scarcity.

PROPORTION OF 16-17 YEAR OLDS WHO FEEL THAT ENGINEERING CAN ACHIEVE THE **FOLLOWING WITHIN THE NEXT 20 YEARS**

PRIORITIES FOR ALL 16-17 YEAR OLDS IN ALL MARKETS	TOTAL	UK	US	GERMANY	TURKEY	INDIA	CHINA	SOUTH KOREA	JAPAN	SOUTH AFRICA	BRAZIL
Reduce unemployment	50%	28%	57%	34%	68%	66%	71%	36%	12%	60%	53%
Address climate change (e.g. limit carbon emissions)	55%	46%	49%	37%	73%	60%	66%	68%	33%	58%	60%
Improve renewable energy (e.g. solar, wind, fusion)	74%	51%	66%	68%	79%	87%	89%	78%	63%	76%	77%
Address housing challenges	58%	28%	50%	58%	79%	73%	82%	43%	43%	69%	58%
Address infrastructure challenges (e.g. roads, plumbing, cities)	76%	61%	73%	69%	82%	80%	98%	75%	55%	82%	79%
Address food scarcity	50%	23%	40%	18%	65%	71%	76%	47%	27%	55%	71%

FIGURE 10

The role and expectation of 16-17 year olds from engineering is evolving, with most feeling present day engineering should focus on new innovations but demanding a drastic shift for the future: while only 47% of 16-17 year olds feel the role of engineering today includes solving the world's problems (placing it in 9th place), 62% feel it is the role of engineering in the future (placing it in 1st place).

ROLE OF ENGINEERING TODAY VS. IN THE FUTURE

ROLE OF ENGINEERING TODAY (16-17 YEAR OLDS)		ROLE OF ENGINEERING IN THE FUTURE (16-17 YEAR OLDS)	
To inspire new innovations	64%	To solve the world's problems	62%
To improve the quality of people's lives	62%	To improve the quality of people's lives	59%
To drive progress in society	60%	To drive progress in society	58%
To help the economy grow	60%	To solve my country's problems	58%
To inspire today's youth	60%	To inspire new innovations	56%
To provide new job opportunities to my community	57%	To help the economy grow	55%
To raise public awareness of challenges and progress	50%	To provide new job opportunities to my community	51%
To solve my country's problems	48%	To raise public awareness of challenges and progress	47%
To solve the world's problems	47%	To inspire today's youth	47%
To inform public policy	43%	To address social issues in society	46%
To address social issues in society	42%	To inform public policy	45%

FIGURE 11

When broken down by country, the shifting role of engineering becomes more complex, with most agreeing the role of engineering today should focus on inspiring new innovations. However, the role of engineering in inspiring today's youth, while seen as a priority by South African youths, is seen as important by less than half of 16-17 year old Germans. A similar disparity is found in engineering's role in informing public policy, with China feeling this is a major role for the sector, while the UK feels the opposite.

ROLE OF ENGINEERING TODAY VS. IN THE FUTURE (COUNTRY BACKGROUND)

ROLE OF ENGINEERING TODAY (16-17 YEAR OLDS)	TOTAL	UK	US	GERMANY	TURKEY	INDIA	CHINA	SOUTH KOREA	JAPAN	SOUTH AFRICA	BRAZIL
To inspire new innovations	64%	69%	73%	72%	65%	65%	67%	47%	51%	64%	65%
To inspire today's youth	60%	59%	59%	48%	66%	67%	62%	49%	41%	76%	65%
To inform public policy	43%	18%	42%	32%	43%	53%	71%	34%	25%	56%	50%

ROLE OF ENGINEERING IN THE FUTURE (16-17 YEAR OLDS)	TOTAL	UK	US	GERMANY	TURKEY	INDIA	CHINA	SOUTH KOREA	JAPAN	SOUTH AFRICA	BRAZIL
To solve the world's problems	62%	69%	61%	70%	57%	45%	83%	56%	74%	49%	68%
To inspire today's youth	47%	36%	55%	44%	44%	36%	78%	43%	47%	36%	53%

FIGURE 12

When looking at the role of engineering in the future, most markets agree unanimously on solving the world's problems being key. However, inspiring today's youth becomes a priority for China, while South Africa does not feel it is a role for engineering in the future.

MOTIVATIONS FOR CHOOSING ENGINEERING AS A CAREER



FIGURE 13

The shifting role of engineering towards social purpose is also impacting global youth's motivation for pursuing engineering as a career, with contribution to society trumping career opportunity for 16-17 year olds (compared to the opposite amongst total population). This is particularly true for 16-17 year olds in the UK, US, and Japan and less so for Brazil and South Korea.



METHODOLOGY



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he online survey was in field in May 2015 (UK) and June to July 2015 (rest of markets: USA, Germany, Turkey, India, China, South Korea, Japan, South Africa, Brazil).

In order to target the population according to our purpose, the study was conducted using an online panel of people willing to participate in surveys. This interviewing method provides both accessibility (through either desktop, laptop, or tablet), flexibility, and privacy for the participants, enabling higher quality findings through more honest responses.

The study interviewed a total of 10,341 individuals, of which 496 where 16-17 year olds. Base sizes of 16-17 year olds per country vary from 49 to 55 per market:

	UK	US	GERMANY	TURKEY	INDIA	CHINA	SOUTH KOREA	JAPAN	SOUTH AFRICA	BRAZIL
TOTAL BASE SIZE	1,000	1,038	1,003	1,050	1,015	1,048	1,103	1,028	1,028	1,028
16-17 YEAR OLD BASE SIZE	39	51	50	51	55	50	50	49	51	50

Ensuring samples are representative of the countries surveyed: Respondents were selected to form a representative sample of the general public in the 10 markets interviewed through their distribution of age, gender, and region according to national statistic figures. Social grade was monitored.

Ensuring consistent answers: The flow and order of the questionnaire was optimized to ensure consistency. Additionally, questions were written by expert Market Research Society certified research practitioners to ensure neutrality and protect the results from bias. Ensuring accuracy and protecting results from bias: The data was captured by a team which verified the quality and accuracy of the responses to prevent 'flat-liners' and 'speeders' (respondents who just click through the survey without reading the text).

Margin of error: circa 3% on a 95% confidence interval

