THE YOUNG MINDS MONITOR

A survey by GE of 1,000 engineering students and lecturers

Executive Summary

This report is based on a major survey commissioned by GE of nearly 1,000 engineering students and lecturers who were asked their views about the current state of the engineering technology sector.

The research sought to find out what technology leaders of today and tomorrow think about the future of engineering technology as well as the perceptual differences between lecturers and students. The sample was of 861 students and 123 lecturers from a range of UK institutions. The interviews were conducted by OpinionPanel in late February and early March 2011.

Four key highlights emerged from the findings:

- Societal views of engineering, which were seen as critical in securing the UK's long-term competitive advantage in the world;
- The job market, which students are more optimistic about than their lecturers;
- Challenges facing the sector, which are impacting on its ability to contribute to the UK's economic prosperity;
- The UK's international competitiveness, which is seen as lower by lecturers than the USA, Germany, Japan and India, but still high by students.

Societal views of engineering

Key Findings:

The way in which engineering is viewed by society is seen by lecturers as the most important factor in developing a best in class culture in the UK, coming ahead of investment in higher education or businesses. There is clearly a challenge to improve the image of engineering - despite the fact that students see it as positive, many lecturers think it is more difficult to attract people to the sector than it was when they first began their career.

A new generation of engineers is being inspired, although not as much by the IT innovators such as Steve Jobs and Bill Gates, but by more traditional British engineering figures such as James Dyson and Isambard Kingdom Brunel. Moreover, it is the fact that engineering is an interesting topic, can have practical applications to solve some of the world's challenges and makes a tangible difference to society that appeals to young people. Career and salary prospects are not as important.

92% of students think engineering technology has a positive image as a career compared with other science disciplines.

Do you think engineering technology has a positive image as a career compared to other science disciplines?

Why did you decide to pursue a career in engineering?

1. It is an interesting topic.
2. Because engineering technology is a way to solve the worlds biggest problems.
3. Because of the contribution you feel it makes to society/economic prosperity.
4. The career prospects.
5. The UK is considered to be a leader in this area.
6. The salary prospects.
7. It was considered to be fashionable.

For lecturers, the fact that engineering is an 'interesting topic' was the most important reason behind their decision to pursue it as a career (89%) - not career prospects (28%) or the salary prospects (6%).

The fact that engineering is an interesting topic is the most important reason behind students' decision to study the topic (82%), but career prospects come a close second (77%), reflecting the fact that students are much more optimistic about career opportunities in engineering than their lecturers. Students are also far more positive about the profession's salary prospects (52%) than lecturers (6%).

Lecturers see attracting the right talent into the engineering technology sector as more of a problem (49%) now than when they started their career. Only 14% think it is less of a problem.

Do you think attracting the right talent into the engineering technology sector is more of a problem, or less of a problem as when you started your careers?

Developing a positive societal attitude towards the benefits and value of engineering technology is seen as the most important ingredient for lecturers (86%) in order to develop a best in class engineering culture in the UK.

Lecturers: which of the following do you believe are essential ingredients to develop a best in class engineering technology culture here in the UK?

- A positive societal attitude regarding the benefits and value of engineering technolgy.
- Investment in higher education/more vocational training.
- More funding for research grants.
- Governement support and incentives.
- Free movement of talent/ ability to move talent in from overseas as required.
- More apprentices.
- Good access to supporting services.

Inspiring a new generation of engineers

The research asked the question, "Who do you consider to be your hero/icon in your field?" Students gave a range of answers from well-known historical figures such as Brunel and Newton, to modern day icons such as Steve Jobs and James Dyson. Many students also cited their own professor or inspiring family members as their heroes.

The Top 10 Engineering Heroes are as follows:

1 **Isambard Kingdom Brunel –** Leading civil engineer of 19th Century, built bridges, dockyards and railways.

2 **James Dyson –** Industrial designer who developed a new generation of vacuum cleaners and actively supports engineering projects in the UK.

3 **Steve Jobs –** Co-founder and CEO of Apple Inc., which developed some of the most iconic personal technology products including the Mark II computer and iPod.

4 **Nikola Tesla –** Inventor and engineer whose work formed the basis of modern alternating current electric power systems.

5 **Bill Gates –** Co-founder and Chairman of Microsoft, who developed the industry standard operating system for personal computers.

6 **Frank Whittle –** RAF engineer who is credited with inventing the first jet propulsion engine.

7 **Isaac Newton –** Physicist and theoretician who developed the concepts of mechanics, gravity and the laws of motion and invented the reflecting telescope.

8 **Albert Einstein –** Theoretical physicist who developed the theory of general relativity and is considered the founder of modern physics.

9 **Charles Rolls & Henry Royce –** Developed early engine technology and luxury motor vehicles.

10 **Thomas Edison –** Inventor of the first commercially viable light bulb, motion picture camera and phonograph who revolutionised electrics and communications.

The research also looked at the innovations that most inspired this new generation of engineers. Asked what they thought the most world changing innovations were over the past century, the students listed their top five as being:

1 **Computers and Electronics.**

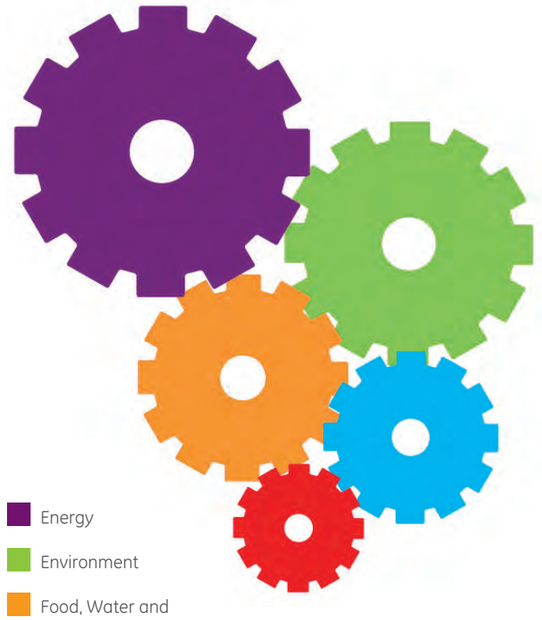
2 **Communications Technology.**

3 **Transportation Technology.**

4 **Power and Energy Technology.**

5 **Manufacturing and Materials computers.**

The GE Young Minds Monitor also looked at what students saw as the biggest challenges that engineering technology should look to address. The top five were listed as:



- Energy
- Environment
- Food, Water and Natural Resources
- Societal Issues
- Quality of Education

The Job Market

Key Findings:

There is a clear disparity between students and lecturers in terms of the UK job market for engineering graduates. While more than nine out of ten students are confident of their career prospects when they graduate, lecturers think it is harder to attract young people into the sector; that the UK doesn't have a growing talent pool to draw on; and that the UK scores lower than other countries for its prospects. Again, it is not higher pay or better career prospects that would encourage more people to choose engineering, but rather the more tangential concept of a higher status for engineering, reflecting the value that engineering brings to the UK economy and solves particular societal or environmental challenges. One of the most significant challenges for the sector is the lack of women who are interested in studying engineering or pursue it as a career – something that both students and lecturers agree is a major problem.

91% of students think they will go on to develop a career in engineering and 92% are confident they will be able to work in the field of engineering technology when they graduate.

How confident are you that you will be able to work in the field of engineering technology when you graduate?

- Very confident/ confident
- Not confident/ Not at all confident

What would encourage more people to come into engineering?

Higher status (37%) is seen as more important than higher pay (23%) to encourage more young people to come into engineering.

- Higher status
- Higher pay
- Better career prospects
- Better image
- Other

Lecturers: "The UK has a growing talent pool to draw on"

More than half (54%) of lecturers disagree or strongly disagree that the UK has a growing talent pool to draw on.

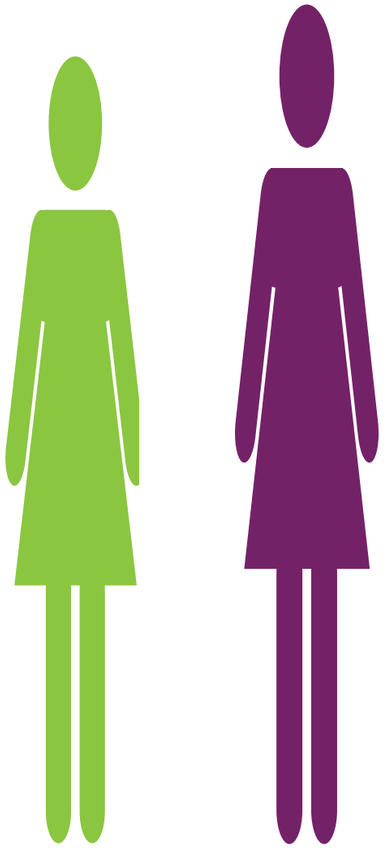
- Strongly agree / agree
- Neither
- Strongly disagree / disagree

There are major problems with engineering being seen as a mostly male club. Both students and lecturers agree or strongly agree that the UK struggles to attract enough women (68% and 65%) into engineering technology.

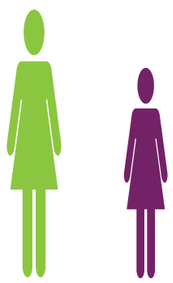
The UK struggles to attract enough women into engineering technology

Lecturers

Students



Stongly agree/ agree



Neither

Strongly disagree/ disagree

Challenges facing the sector

Key Findings:

The engineering sector is seen as critical to the UK economy with an overwhelming 90% of students thinking it is very or fairly important to contribute to the UK's economic prosperity.

However, in order to fulfil the UK's true potential in the engineering field, there are a number of areas that need to be addressed.

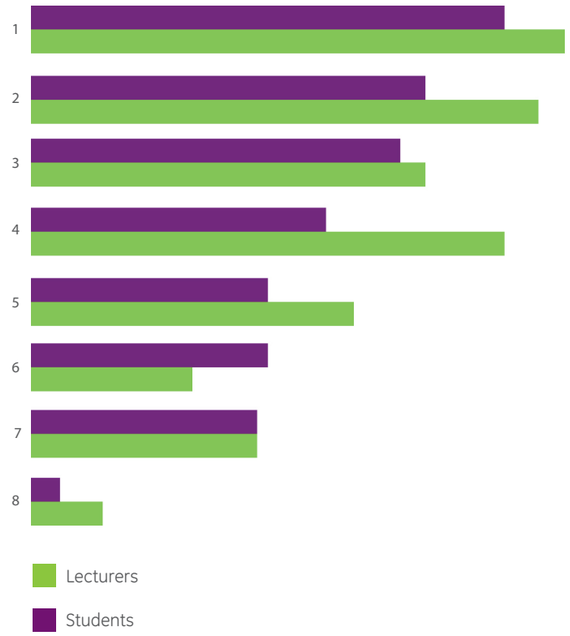
Lecturers and students are concerned about the impact of cuts in public spending and rising tuition fees on the number of young people selecting an engineering technology degree in the future (62% and 60% respectively).

77% of students think the government should do more to support the engineering technology sector while 61% of lecturers disagree with the government's strategy for the sector.

Students and lecturers are in agreement that the most essential ingredient to developing a best in class engineering technology culture in the UK is a positive societal attitude towards the benefits and value of engineering technology, followed by investment in higher education.

Just over half of lecturers (52%) feel that the free movement of talent from overseas is required while just over one third (38%) of students think this is an essential ingredient.

Which of the following do you believe are essential ingredients to develop a best in class engineering technology culture here in uk?



1. A positve societal attitude regarding the benfits and value of engineering.
2. Investment in higher education/more vocational training.
3. Government support and training.
4. More funding for research grants.
5. Free movement of talent/ability to move talent in from overseas as required.
6. Good access to supporting services.
7. More apprentices.
8. Other.

Over three quarters of lecturers (70%) feel that the government's plans for an immigration cap could have a negative impact on the UK's talent pool. In contrast students are divided in their views with just over a third agreeing with this statement and just over a third disagreeing with it.

Students are more optimistic than lecturers when it comes to the strength of the UK's skills base compared with other parts of the world. Over half of students questioned (59%) felt the UK's skills base is stronger than other countries compared with only a third of lecturers (34%) who feel this way.

The UK's international competitiveness

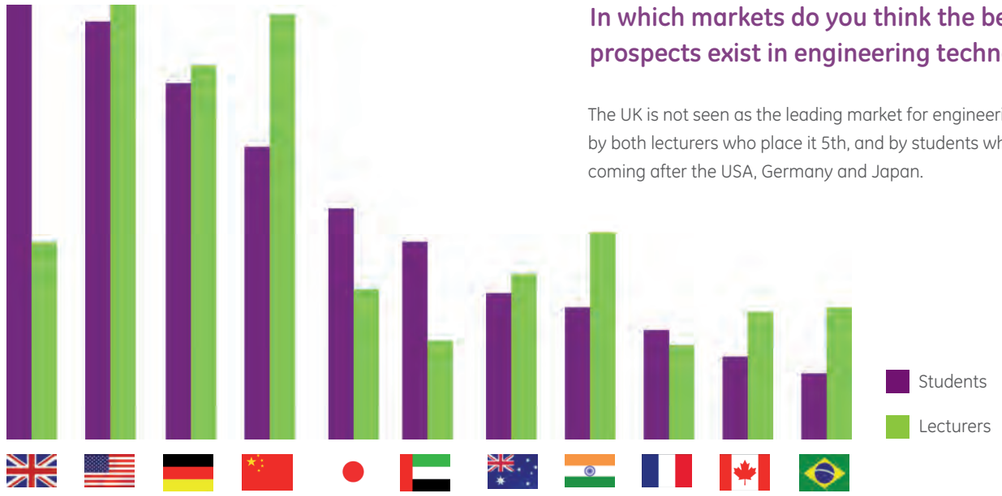
Both students and lecturers feel that the UK is not the leading market for engineering technology, with countries such as the USA, Germany and Japan getting more mentions amongst both groups. However, students are more optimistic about the career prospects in the UK, mentioning it as the market with the best prospects. Lecturers, however, gave it only the 5th most frequent mention.

Interestingly, the UK was seen as better than the rest of the world in terms of academic standards, but lagging behind in terms of funding and R&D investment, suggesting that the UK's prowess could be threatened in the long-term. Lecturers, but not students, were concerned about the impact of the immigration cap (likely reflecting the importance of foreign students' fees to universities) and both groups were concerned about the lack of women and young science students choosing to go into engineering. Greater investment in higher education was slightly favoured by students over government funding or higher skilled people to increase the UK's competitive position.

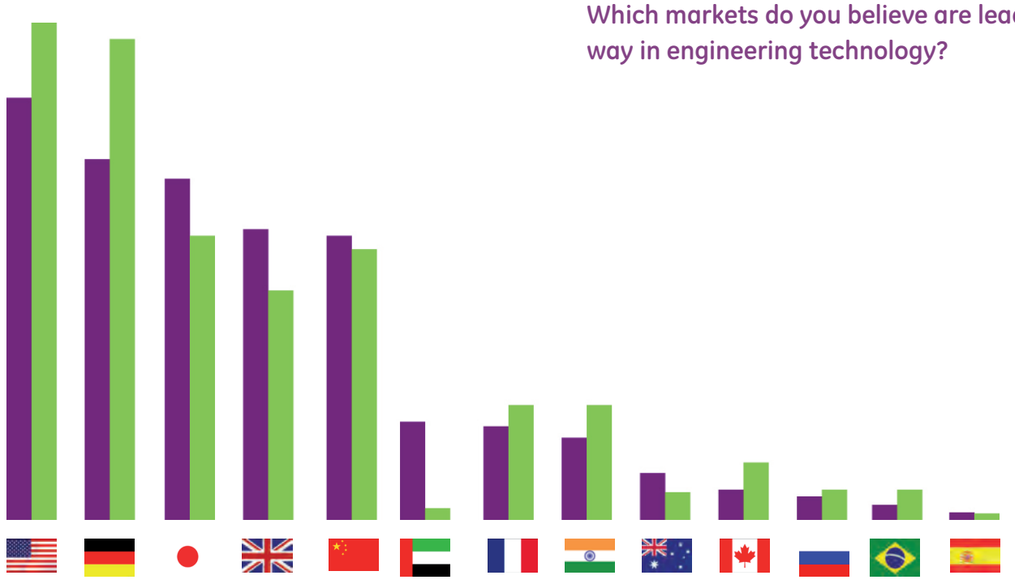
The UK is seen as having the best career prospects in engineering technology among students (68% mention) narrowly ahead of the USA (66% mention). However, lecturers are far less optimistic about the career prospects in the UK; it is only the 5th most mentioned market (31%) for having the best career prospects in engineering technology, coming well below the USA (68%), China (67%), Germany (59%) and India (33%).

In which markets do you think the best career prospects exist in engineering technology?

The UK is not seen as the leading market for engineering technology by both lecturers who place it 5th, and by students who place it 4th, coming after the USA, Germany and Japan.



Which markets do you believe are leading the way in engineering technology?

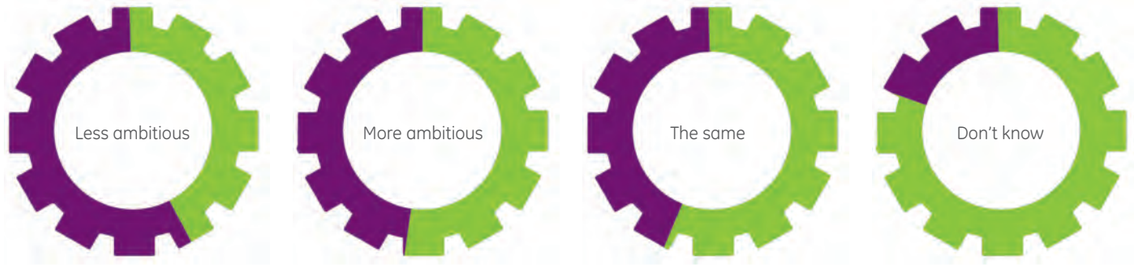


The UK is seen by lecturers as worse or much worse in terms of funding (40%) and R&D investment (43%) devoted to engineering technology compared to the rest of the world, although better or much better in terms of the standard of academic study (63%).

Lecturers: How do you believe the UK compares with the rest of the world in terms of the resources devoted to engineering technology with respect to the following?

And the UK is seen as less ambitious by both lecturers (56%) and students (41%) than the rest of the world regarding the desire to be world leading in the field of engineering technology.

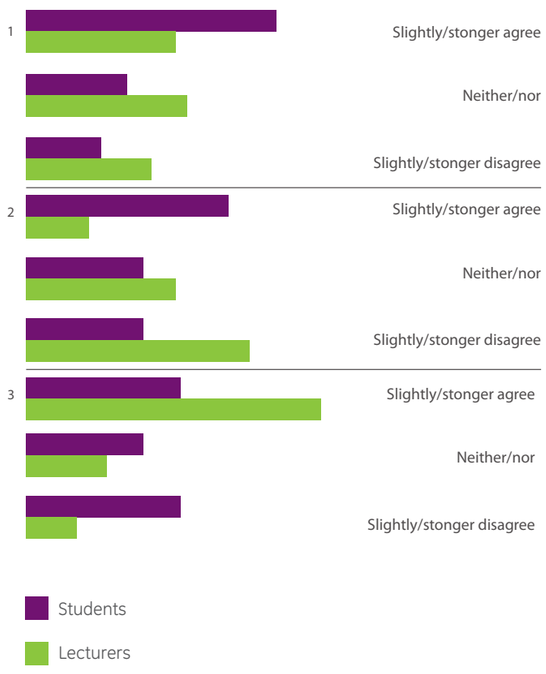
How does the UK compare with the rest of the world regarding the desire to be world leading in the field of engineering technology?



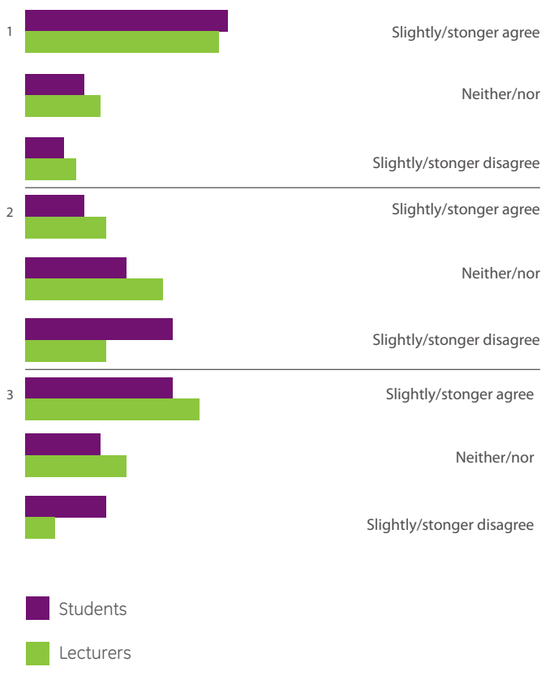
While most students agree that the UK has a stronger skills base than other countries and a growing talent pool to draw on, 37% are concerned about the effect of the cap on immigration, and 68% think the UK struggles to attract enough women and 48% think it struggles to attract enough ethnic minorities and young science students into the sector.

Students
Lecturers

Thinking about how the UK compares with the rest of the world in terms of talent in the field of engineering technology, to what extent do you agree with the following statements?

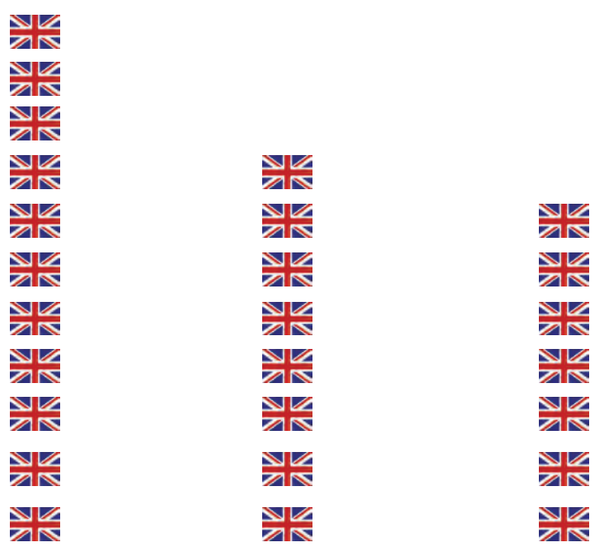


1. The UK has a stronger skills base than other countries around the world.
2. The UK has a growing talent pool to draw on.
3. The govts plans for a cap on immigration will have a negative impact on the UK's talent pool.



1. The UK struggles to attract enough women in engineering technology.
2. The UK struggles to attract minority ethnic groups into engineering technology.
3. The UK struggles to attract young science students into engineering technology.

Students: What does the UK need to do to increase its competitive position?



1. More investment in uni/colleges of further education.
2. More govt funding.
3. More highly skilled people.

Students see having more investment in higher education and colleges of further education as the most important factor in increasing the competitive position of the UK.

Timeline of engineering innovations that changed the world:

3,100BC - Earliest example of wheel and axle mechanism.

1822 - Charles Babbage designs the first calculating machine, removing human error from mathematical computations.

1888 - Nikola Tesla develops basis for modern AC electrical power systems.

1978 - US military develops first GPS system.

1430s - Johann Gutenberg perfects the printing press.

1829 - Stephenson's Rocket, the forerunner of the modern train is built.

1903 - Wright brothers achieve the first powered flight.

1981 - IBM introduces the 5150 Personal Computer, the first recognisable, affordable and mass market PC.

1712 - Thomas Newcomen builds first commercially successful steam engine.

1846 - The first pneumatic tyre patented.

1908 - Ford begins mass production of the model T.

1989 - British scientist Tim Berners-Lee develops the World Wide Web.

1807 - Marc Brunel in England devised equipment using 22 kinds of machines that produced identical items in process sequence one at a time.

1876 - Alexander Graham Bell invents the telephone. items in process sequence one at a time.

1968 - Douglas Engelbart holds the 'mother of all demos' showcasing technologies that would become commonplace such as word processing, computer mouse and email.

2001 - Steve Jobs unveils the iPod which can fit '1,000 songs in your pocket'.

1821 - Faraday demonstrates electro-magnetic rotation, the principle of the electric motor.

1879 - Thomas Edison successfully tests the first commercially viable incandescent light bulb that will become an industry standard.

1973 - Martin Cooper of Motorola makes the first call from a handheld mobile phone to his long-time rival, Dr Joel S Engel of Bell Labs.

2004 - Mark Zuckerberg launches "The Facebook" from his dormitory in Harvard.

Contact details

30 Berkeley Square
London W1J 6EW

Mark Maguire
GE UK Corporate Communications Director
mark.maguire1@ge.com

Ilan Jacobs
Head of GE UK Government Relations
ilan.jacobs@ge.com