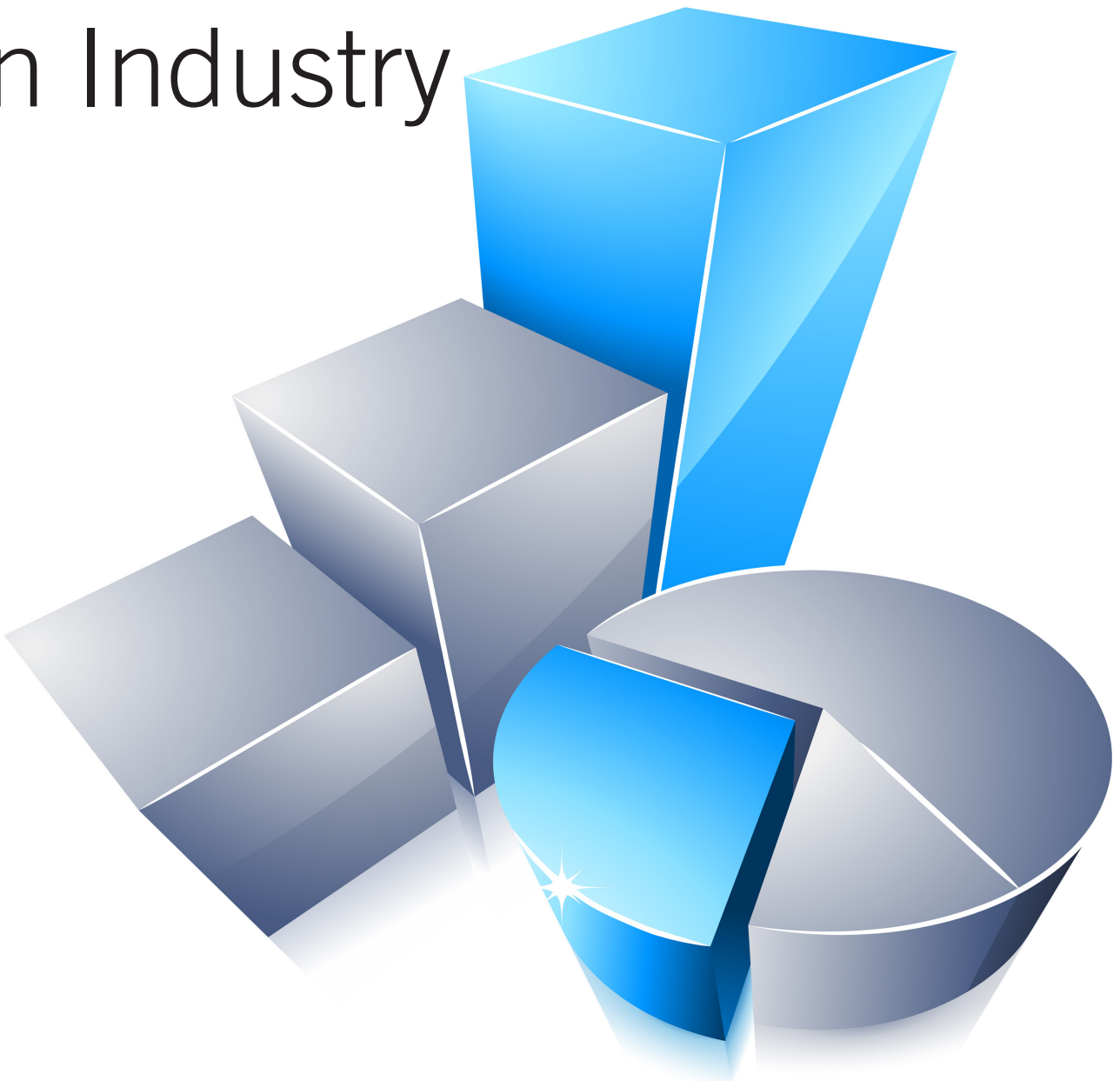




A new Institution from the IEE and IIE

Summary of 2006 Survey Findings:

Engineering and Technology **Skills and Demand** in Industry





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Summary of survey findings:

Engineering and Technology Skills and Demand in Industry

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Executive Summary

This survey was carried out by the Institution of Engineering and Technology (IET) to determine whether there is a shortage of engineers and technicians in the UK. This preliminary research is intended to be a first step and to be followed up with a more in-depth study, taking into account the findings of other recent work.

From the findings below, it is clear that UK industry is in need of more engineers and technicians, and the decline in student numbers on degree courses and vocational training is not a reflection of the market needs, but rather a market failure.

This survey provides further backing for the Institution's long standing calls that we need more engineers and technicians. We believe to achieve this the UK needs:

- Work to overhaul the image of science and technology.
- Appropriately subject-qualified and trained school teachers, with access to continuing professional development.
- Suitable science and technology facilities to allow teachers to inspire the next generation of engineers.

Key findings

The key message from the survey was many areas of the engineering and technology sector are still growing (78% recruiting graduates; 40% citing business expansion or diversification as the reason for recruitment) but recruiting people with the right skills is proving hard. The survey also suggests that employers broadly assume that all new employees straight from education (including vocational courses) will require further training, although apprentices and graduates were ranked highest in terms of "job readiness".

We found that nearly 35% of the companies did not expect to be able to recruit enough suitably qualified technical staff this year, a figure that rose to 40% when asked about four years time (Chart 1, overleaf). Senior engineers (5-10 years experience) have emerged as the most in demand with more than half of respondents saying that they are currently experiencing problems recruiting them. This suggests there may be retention issues that are having as great an impact as graduate recruitment – further work may find senior engineers are leaving the profession.

Companies were also asked to identify the possible reasons they saw as leading to these recruitment problems (Table 1). The majority cited a lack of suitably qualified candidates, but a number also cited problems in specialist areas of engineering – for example in laser and optical technologies, or RF and microwave engineering. When asked the same question about future recruitment, the responses were broadly the same, with the addition that confidence in the education system to remedy the problem was low.

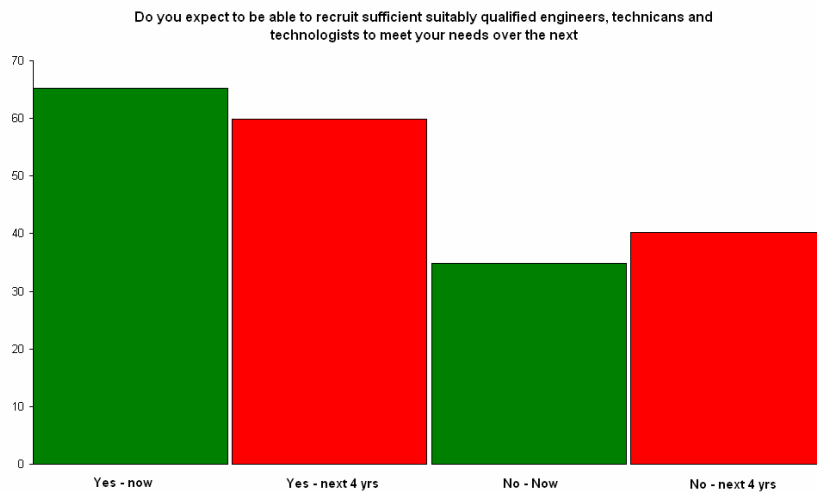
Salary: A number of respondents raised the issue of salaries, saying that they were unable to offer a sufficient salary. It is not clear whether this is further proof that engineering graduates are being tempted away, i.e. into financial services, by larger salaries, or that in specific regions of the UK, long-term high-paying projects dominate (i.e. oil and gas industry). One company reported increasing labour costs in the UK meant they used facilities overseas.

Table 1 - Q10 Top responses to "reasons for difficulty in current recruitment"

1. Lack of suitably qualified candidates
2. Shortages or difficulty with specific skills
3. Unable to offer sufficient salary
4. Candidates lacked the right experience

Although this makes for bad news for the industry at large, these findings do suggest that there are strong prospects for those considering engineering courses.

Chart 1 – Q9 “Do you expect to be able to recruit suitably qualified engineers, technicians and technology to meet your needs”



Further work, carried out from the perspective of the newly qualified graduate/technician may help in producing careers messages. However, the Engineering Technology Board (ETB) Engineering statistical summary¹ suggests that engineering graduate's starting salaries do not compete with the banking and financial sector.

Higher Education: University intake was seen as a potential issue. This may be reflecting concerns over the Higher Education sector's output of engineers, in light of the UCAS application data showing declines in some engineering disciplines of nearly 20%². It was clear from the comments regarding why there was likely to be a shortage in the future that a number of employers did look at the current crop of engineers and technicians going through the system and lacked confidence in either student numbers or their skills.

Skills level: Respondents were asked to broadly identify if there were specific skills levels where they were having problems. Recruiting senior engineers made up more than 55% of the problem, followed by 23% for graduates and 21% for technicians.

Regions: The survey also asked if companies who were experiencing a skills shortage found it was most acute in a specific region of the UK. Of the 36% that answered they did experience a regional variation, the South East (including London) came out as being the most problematic. This was followed by a fairly even spread across the rest of the country.

What needs to be done: Our final question gave our respondents the opportunity to state what they believe the most important course of action was to address the problems they had diagnosed (Table 2).

Taking action to improve the image of engineering and technology in schools ranked very highly, as did activities to improve elements of the education system – at all levels. Taken together, activities within and around schools accounted for nearly 60% of all comments.

Improving and creating new tax incentives for on-the-job training were highlighted by the third largest group, closely followed by improving the status of engineers (i.e. for it to become a reserved title) and forging better links between industry and education, via placement schemes.

¹ Engineering and Technology Board “Engineering UK 2005” http://www.etechnology.co.uk/pdf/Engineering_UK_2005.pdf

² UCAS Applications statistics <http://www.ucas.com/new/press/index.html>

Table 2 – Q16 “Are there any specific activities or policies to pursue”

Top responses to “Are there any specific activities or policies, either for the IEE or Government, that you believe would have a strong impact on any skills shortages you perceive?”

- | |
|---|
| 1. Tackle problems in the Education system – more practical classes, better resources |
| = Promote engineering and technology to young people more effectively / improve image |
| 3. Offer improved funding / tax incentives to train young people on-the-job. |
| 4. Introduce a scheme to create the same status for engineers as in other countries |

Our sample

This survey was carried out by the IET on an internet based platform with invitations to complete the survey going out to approximately 500 IET business partners. The response rate was just over 22%, which is high compared to similar surveys and we believe further reflects concern about this issue. Total number of responses was 113.

Whilst not a random sample, the companies responding represented a mix of UK companies, all in the engineering and technology sector. Just over 30% had only one site, and around 30% had more than five (see Chart 2). Around 12% employed over 1000 people in technical or engineering roles, although 13% had fewer than 10 (see Chart 3).

Chart 2 – Q1 “How many UK sites”

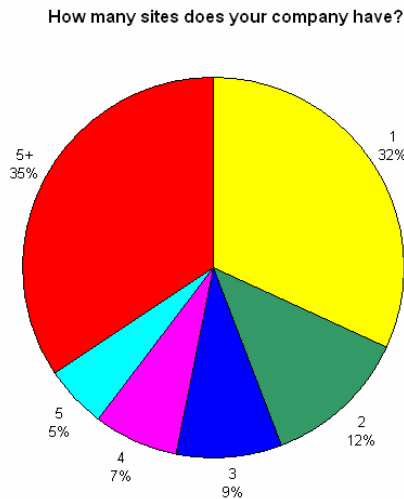
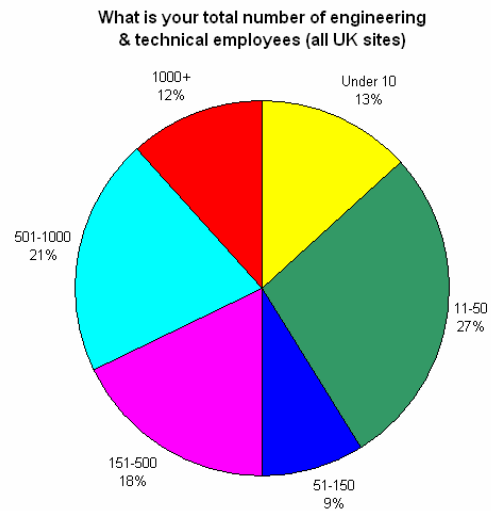
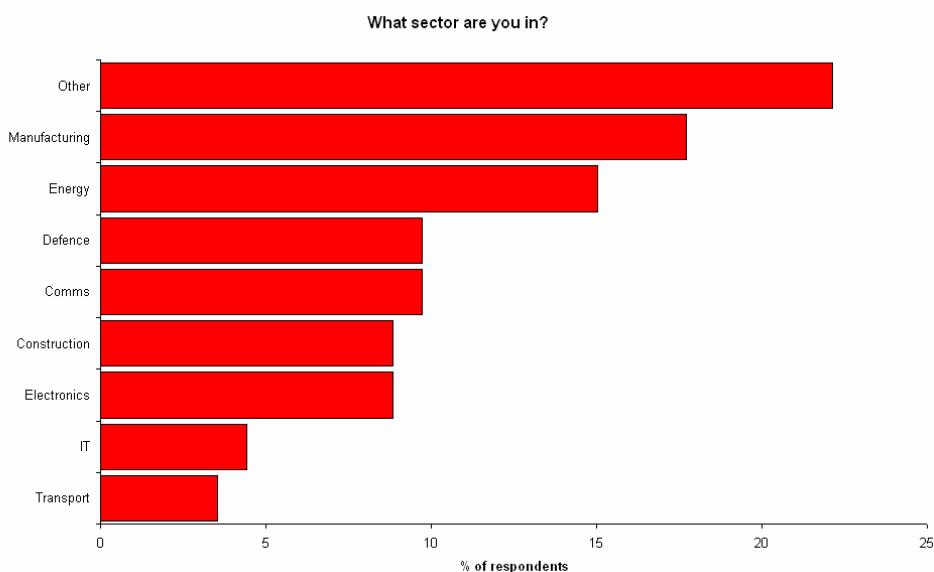


Chart 3 – Q5 – No. of tech. employees



Our respondents were also from a cross section of UK sectors (Chart 4). The “other” category came top, which is a reflection of the interdisciplinary nature of engineering, and the IET. “Other” sectors ranged from medical to media and from environmental to construction.

Chart 4 – Q2 – What Sector are you in?

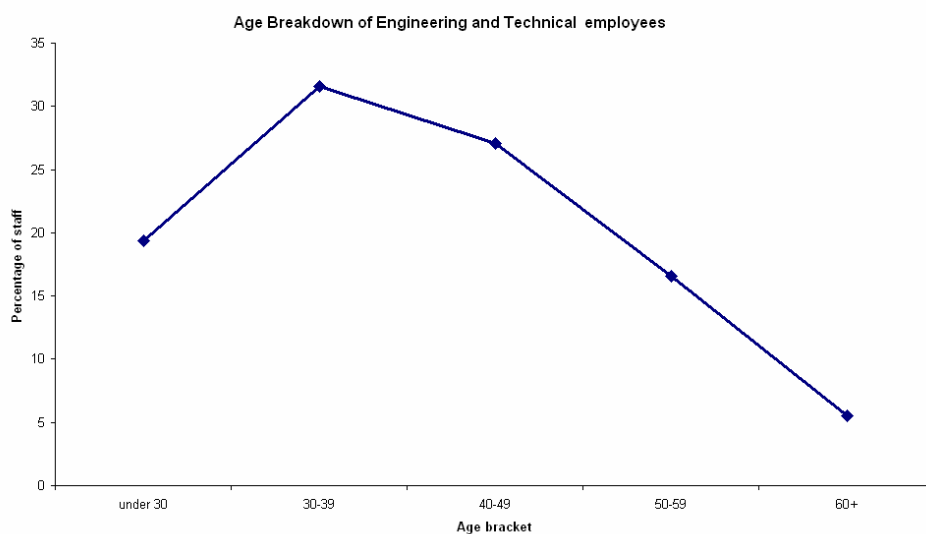


Both numbers of technical and general staff were spread out across the full spectrum, as expected. However, as IET business partners are typically larger companies, these are slightly over represented.

As a percentage of the respondents, large companies (over 500 employees) made up 49% with those with over 1000 employees accounting for just over 35%. It is also interesting to note that for question 7 (see appendix), when asked about recruitment, consistently the top 10 recruiters (by numbers) were looking for between 50-90% of all candidates required.

The age profile of our respondent's technical work force was also measured (Chart 5). The largest group in the work force was the 30-39 category, with a third of all staff. The profile is surprisingly healthy. It is in contrast to work carried out previously in specific sectors, for example power engineering, where it has been found that there are a high percentage nearing retirement.

Chart 5 – Q6 – Please give a % age breakdown of engineering and technical staff



About the Institution of Engineering and Technology

IET works to improve education and professional skills in STEM subjects in a number of ways including:

- **Power Academy** Numbers of new power engineers, responsible for maintaining UK electricity generation, are especially low. IET is a partner in the Power Academy, a joint programme between industry and academia that sponsors around 60 power engineering students every year.
- **The Faraday Lectures** are designed to encourage interest in the world of engineering for young people aged between 14 and 16. These travelling lectures are broadcast worldwide on www.iet.tv and reach over a million students in the UK and Asia.
- **Continuing Professional Development Programmes** (CPD) work with employers to provide CPD for engineers and technicians. IET CPD support extends to teachers – Electronics in Schools (EISS) provides them with specialist electronics resources and CPD. www.electronicsinschools.org
- **Scholarships:** £360,000 in 2006 for scholarships at all levels of academia, a 60% increase.

The IET also has an expert group advising on education policy. Through input from this group and members, we have determined what we believe the top policy priorities must be:

Appropriately subject-qualified and trained teachers

We need more STEM teachers. Schools are facing problems recruiting new teachers, and some current STEM teachers do not hold appropriate subject qualifications - or are being asked to teach other STEM subject on top of their own.

Confidence and enthusiasm are essential to teaching, and a teacher's knowledge and understanding contribute heavily to this.

We must offer teachers **opportunities to train and develop.**

Suitable Facilities

Out of date science and technology labs put the teacher at a disadvantage from the start. Students can be easily switched off to science at a very early age, and the learning (and experimenting) environment is a key factor in this.

The Government is already putting more money in facilities, but **all schools need modern facilities and steps need to be taken now.**

The image of science, technology and electronics

This is extremely important, but there is no quick fix. Many organisations are already working to improve the image of science and technology amongst students, parents, careers teachers, and the public. **A unified, well funded, approach is needed to really make a difference.**

Full IET Education briefing, and Information on our expert group (Education and Skills Sector Panel) can be found at:

<http://www.theiet.org/publicaffairs/education/>

Further reading / research

“Educating Engineers for the 21st Century: the Industry View”, Henley Management College for the Royal Academy of Engineering (2006)

http://www.raeng.org.uk/news/releases/henley/pdf/henley_report.pdf

This work was published whilst our survey was being carried out. It offers an extremely in-depth view of the skills needed in today’s engineering graduates and where deficiencies are. It also looks at current and future shortages, again with regards to graduate engineers.

This study examines in far more depths a small section of what our survey looked at, and any follow up work we do will take into account the findings. However, where there is cross over on the two pieces of work, there is broadly agreement with regards to results.

Specifically, the Henley study revealed:

“ ... concerns over the long-term pipeline of young talent going from schools onto university engineering courses and subsequently into engineering firms”. (Exec summary, page 3)

In terms of recruitment difficulties, they reported that depending on discipline, between 40-70% of firms reported problems recruiting graduate engineers (Table 9, page 28)

“Engineering UK” Engineering and Technology Board, (2005)

http://www.etechnology.co.uk/pdf/Engineering_UK_2005.pdf

The Engineering and Technology Board (ETB) publish a yearly summary of engineering related statistics. The summary includes statistics from the Higher Education Statistics Agency (HESA), Association of Graduate Recruiters (AGR), Department for Education and Skills, and others.

Appendix – Survey Questions and results

1. Please tell us something about your Company (UK sites only)

How many UK sites does your company have?

Sites	% of sample
1	31.7
2	12.4
3	8.9
4	7
5	5.3
5+	34.5

2. What would you describe as your core business?

	% of respondents
Transport	3.5
IT	4.4
Electronics	8.9
Construction	8.9
Comms	9.7
Defence	9.7
Energy	15
Manufacturing	17.7
Other	22.1

3. If your answer to Q2. was "Other" please write in Core Business here:

Respondents in the other category largely consisted of specialist areas, for example nuclear energy, pharmaceuticals, chemical industries, but also included responses from the media sector, health technologies, broadcasting (technical sides) and food production.

4. What is your total number of employees (all UK sites & disciplines)?

All employees	% of companies overall
Under 10	8
11-50	14.3
51-150	11.6
151-500	17
501-1000	12.5
1000+	36.6

5. What is your total number of engineering and technical employees (all UK sites)?

Eng & Tech employees	% of companies overall
Under 10	13.4
11-50	27.7
51-150	8.9
151-500	17.7
501-1000	20.5
1000+	11.61

6. Please give an approximate percentage breakdown of your engineering and technician employees by age band:

	% of workforce (overall)
under 30	19.4
30-39	31.5
40-49	27
50-59	16.6
60+	5.5

7. Approximately how many graduate and technician engineers and technologists will you need to recruit in 2006?

Graduate

Percentage recruiting: 78%

Total number: 2085

Average per recruiting respondent: 23.4

[Note: 10 largest companies by recruitment accounted for over half the total.]

Technicians

Percentage recruiting: 63%

Total number: 976

Average per recruiting respondent: 13.7

[Note: 10 largest companies by recruitment accounted for over half the total.]

Other

Percentage recruiting: 24%

Total number: 745

Average per recruiting respondent: 27.45

[Note: 10 largest companies by recruitment accounted for nearly 90% of the total]

8. Which of the following reasons apply to your need for recruitment? (you may choose more than one)

	% of respondents
Business expansion	34.72
Retirement	16.2
Staff turnover	31.48
Diversifying / developing other areas	14.81
other	2.78

9. Do you expect to be able to recruit sufficient suitably qualified engineers, technicians and technologists to meet your needs:

This year

	% of respondents
Yes	65.18
No	34.82

Over the next 4 years

	% of respondents
Yes	59.82
No	40.18

10. If you answered "No" to Q9a. please briefly explain reasons below:

Top responses to "reasons for difficulty in current recruitment"
1. Lack of suitably qualified candidates
2. Shortages or difficulty with specific skills
3. Unable to offer sufficient salary
4. Candidates lacked the right experience

11. If you answered "No" to Q9b. please briefly explain reasons below:

Largely same as question 10, with a number of respondents stating they had little confidence things would improve.

12. Are there any skills levels where you are currently experiencing recruitment problems? (please tick all relevant answers)

	% selecting category
Graduate engineers (recently out of university)	23.08
Senior Engineers (5 to 10 years experience)	55.56
Technicians (non graduate, but includes NVQs)	21.37

13. Using a 1-5 scale (where 1 is low and 5 is high) please indicate "how ready to start the job without significant training" new recruits from each of the following categories are:

	Apprenticeships	A level entrants	16-18 yrs with other qualifications	Graduate entrants
1 - Low	31.03	44.71	36.67	8.33
2	25.29	40	38.89	34.26
3	22.99	12.94	18.89	37.96
4	17.24	2.35	4.44	18.52
5 - High	3.45	0	1.11	0.93

14. If your company has more than one site, do you experience any difference in the ability to recruit for technical / engineering roles in the different regions of in the UK?

	% of respondents
Yes	36.14%
No	63.86%

15. If you answered "Yes" to the previous question, please specify which region(s)

South East (including London) came out as being the most problematic. This was followed by a fairly even spread across the rest of the UK.

16. Are there any specific activities or policies, either for the IEE or Government, that you believe would have a strong impact on any skills shortages you perceive?

Top responses to "Are there any specific activities or policies, either for the IEE or Government, that you believe would have a strong impact on any skills shortages you perceive?"
1. Tackle problems in the Education system – more practical classes, better resources = Promote engineering and technology to young people more effectively / improve image
3. Offer improved tax incentives to train young people
4. Introduce a scheme to create the same status for engineers in other countries

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