Summary of 2007 Survey Findings:

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

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Engineering and Technology Skills and Demand in Industry

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Executive Summary

The Institution of Engineering and Technology carried out our first skills survey of engineering and technology businesses in 2006 in order to get an accurate picture of the skills problem facing the sector. This latest survey builds on those findings introducing further questions as well as getting an up to date picture of the key issues.

The survey goes into more depth this year, asking questions about the gender of workforces, required skills needs, skill levels of new recruits and plans for training. It is hoped that over time this work will be able to track the impact that the various public and private sector initiatives are having on the sector, and continue to determine where additional work is needed.

The survey results show we are still suffering from a major shortage of engineering and technology skills, and furthermore there is little confidence that things will improve. Three key findings have emerged:

- On average 8.1 per cent the respondents' engineering & technical workforces are female
- 80 per cent of employers said they would be recruiting "experienced staff"; 50 per cent of companies surveyed said they would <u>not</u> be recruiting school leavers
- Nearly 50 per cent of companies recruited from overseas in the past 12 months to cover specific skills shortages

The importance of engineering and technology can no longer be disputed. The sector in its broadest sense is vital to the future prosperity of the UK's economy. However, in addition to the simple added value that engineering and technology brings to any economy, concerns over the environment and climate change have created new challenges in the sector – across the transport, energy and building sectors specifically.

About the Institution of Engineering and Technology

The Institution of Engineering and Technology (IET) is one of the world's leading professional societies for the engineering and technology community. The IET has more than 150,000 members in 127 countries and has offices in Europe, North America and Asia-Pacific. The Institution provides a global knowledge network to facilitate the exchange of knowledge and ideas and promotes the positive role of Science, Engineering and Technology in the world.

For further information visit www.theiet.org

The Current Workforce

The age profile of the company's workforces has shifted only marginally across the two samples – perhaps unsurprisingly as only 12 months separated the surveys. This year, 18.7 per cent of staff were categorised as being in the 50-59 age bracket, compared to 16.6 per cent last year. It should be noted that since our last survey new legislation has removed any compulsory retirement ages – this is perhaps reflected slightly in the small increase in over 60s employees – now at 6.1 per cent compared to 5.5 per cent.

Age profile of engineering and technical employees
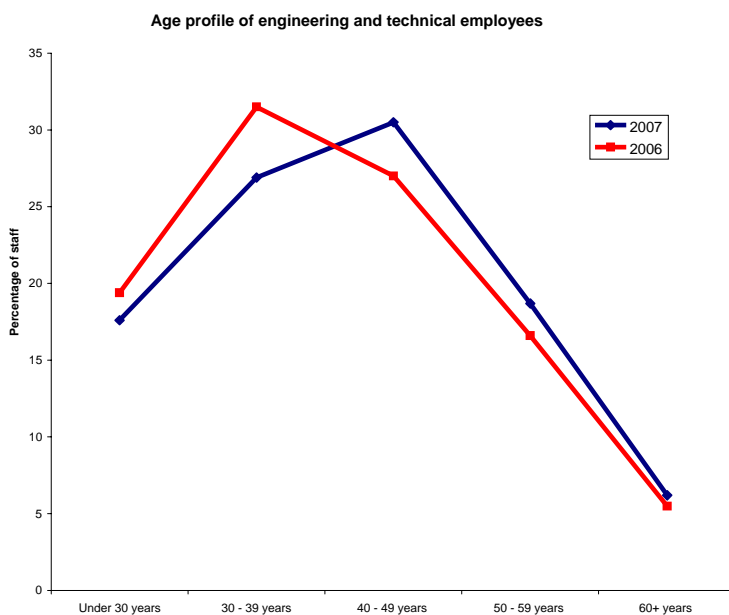
For 2007 we asked about women in the workforce. The survey found that on average 8.1 per cent of the respondents' engineering and technical (e&t) workforce employed in the UK is female, which compares to 22.5 per cent of the overall workforce in engineering / technology firms. The figure for e&t staff is comparable to the Department of Trade and Industry's 2002 figure of 10.6 per cent [1].

Around 28 per cent of respondents said the number of women in their engineering and technical workforce had increased in the last 4 years, but a much higher percentage – nearly 50 per cent - said the number of female applicants and new recruits had remained static over the past 4 years. This is clearly an area that requires further work to address the imbalance.
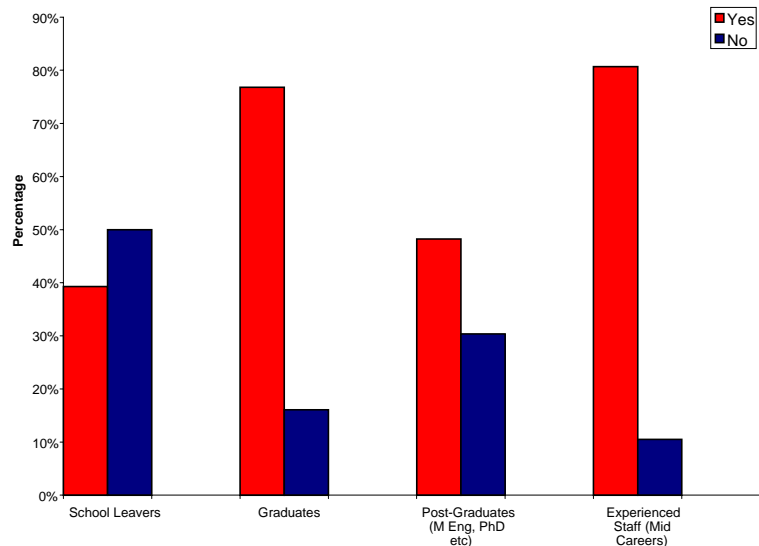
Recruitment

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[1] "In 2002, there were approximately 169,000 male engineers and technologists compared to approximately 18,000 females"
http://www.setwomenstats.org.uk/set4statistics/05_index.htm

The sector is still growing and still recruiting. The demand for experienced staff remains high with just over 80 per cent of companies reporting that they would be recruiting in this group. In contrast over 50 per cent said they would not be recruiting school leavers. These questions were new for 2007, but in 2006 we established that 63 per cent would be recruiting at the technician level.

In 2006 78 per cent said they would be recruiting graduates, which is in line with the 76 per cent we saw this year. Those recruiting postgraduates came in at just under 50 per cent.

Given that experienced staff are the most needed, it is perhaps unsurprising that 71 per cent said they had problems recruiting experienced staff. This has the potential to hinder or stifle growth, and of course is not something that can be fixed quickly – experience quite literally cannot be taught.

Do you plan to recruit new Engineering and Technologist staff, from the following groups, in 2007?

Legend: Yes (red), No (blue). Y-axis: Percentage (0%–90%). Categories: School Leavers, Graduates, Post-Graduates (M Eng, PhD etc), Experienced Staff (Mid Careers).

Practical experience was the top skill lacking in new recruits across school leavers, graduates and postgraduates.

Business expansion remained the top reason for recruitment across all levels (average 33 per cent this year compared to 35 per cent in 2006).

Which countries do you recruit from?

- Other 15%
- USA 7%
- China 13%
- India 19%
- The European Union (EU) 46%
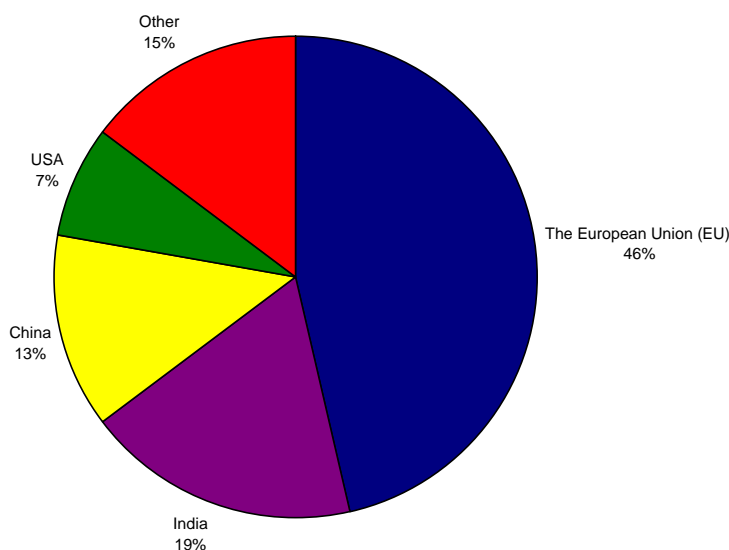
Nearly 50 per cent of companies had recruited from overseas in the past 12 months to cover specific skills shortages. Of those recruiting 46 per cent recruited from the EU, with India (19 per cent), China (13 per cent) and the USA (7 per cent) coming in after. Other countries noted included South Africa.

Skills and Training

Key Findings
- Nearly 90 per cent said they had to provide additional training for new recruits.
- Leadership skills were seen as most lacking in experienced staff, with 24 per cent reporting typical recruits did not meet their expectations.

Our survey showed that nearly 90 per cent of all companies said they had to provide additional training for new recruits. This was further broken down through identifying specific deficiencies amongst "typical" groups of recruits across a variety of different skills levels and areas.

Whilst a lack of practical experience amongst those new to the world of work may not come as a surprise, it should be remembered that the question asked where "reasonable expectations" had not been met. Either employers are expecting too much, or practical experience has perhaps fallen out of favour in our educational establishments.
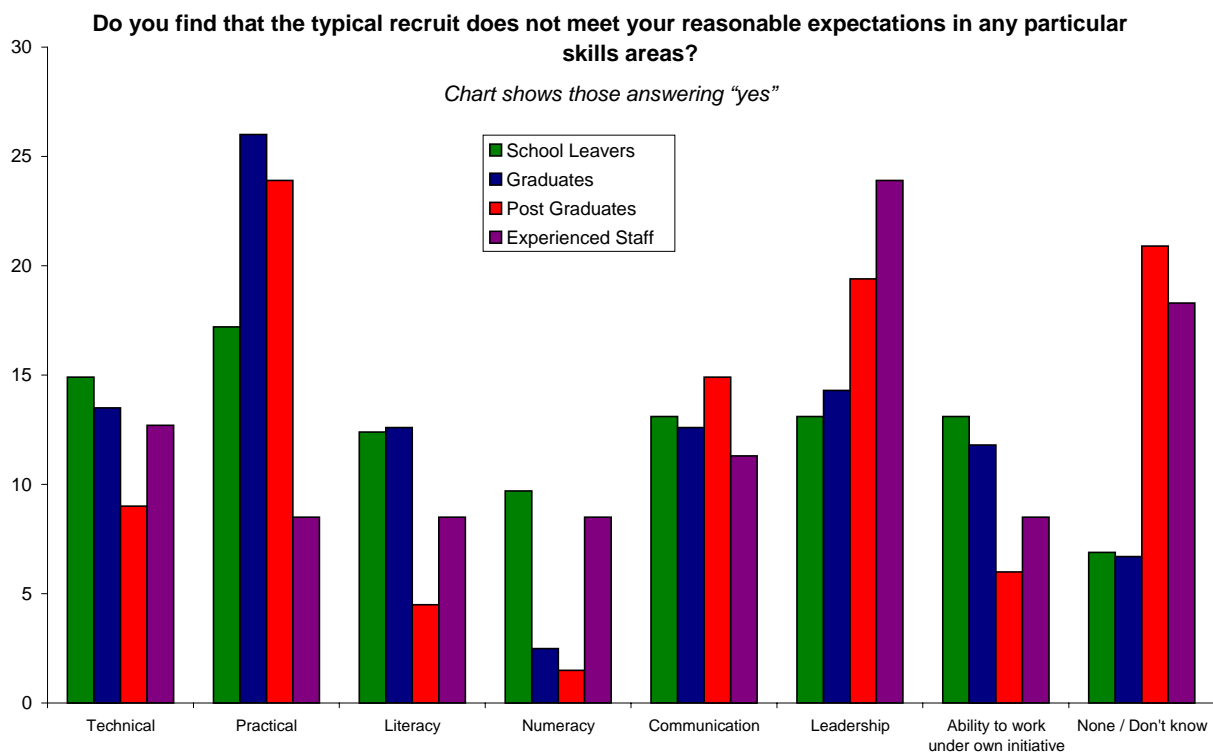
Interestingly, "practical experience" is noted as the biggest issue for school leavers (17.2 per cent), graduates (26 per cent) and even post-graduates (24 per cent). For experienced staff nearly 25 per cent of respondents identified leadership skills as the most lacking.

Do you find that the typical recruit does not meet your reasonable expectations in any particular skills areas?

Chart shows those answering "yes"

Other points to note included a small, yet perhaps surprisingly high, numbers of concerns about literacy of all levels, although numeracy fares better as might be expected in engineering and technical staff.

Of the 89.5 per cent of companies which responded that they had to provide additional training, the most common forms were technical training and mentoring, followed by coaching and communication skills, with leadership also being noted.

Staff were supported in their continuing Professional Development in a number of ways

	Percentage using this support method
Encouraging Professional Registration	83.9
Providing resources	71.4
By offering financial support	62.5
Allowing time off for studying	60.7

For IET business partners and others with a relationship with a professional body like the IET, it is perhaps unsurprising that such a high proportion support their staff's development. It would be interesting to compare these numbers with figures from other sectors.

It was also interesting to note that in terms of programme and courses, the highest percentages went to "own bespoke courses" (67.9 per cent) and allowing employees to select their own courses" (57.1 per cent). This was closely followed by "IET Courses" at 42.9 per cent.

Confidence

Key Findings
- Only 56 per cent said they believed they would be able to recruit enough people into engineering and technical roles this year (Compared to 65 per cent in 2006).
- Over 50 per cent said they did not believe they would be able to recruit the right number of technical and engineering staff in 4 years time (Compared to 40 per cent in 2006).

One of the key findings in 2006 was the lack of confidence our respondents had in future supply of engineering and technology staff. In 2006 an already concerning 40.2 per cent did not feel they would be able to recruit sufficient e&t staff in four years time.

Will you be able to recruit enough engineering and technical staff

Percentage answering " no"
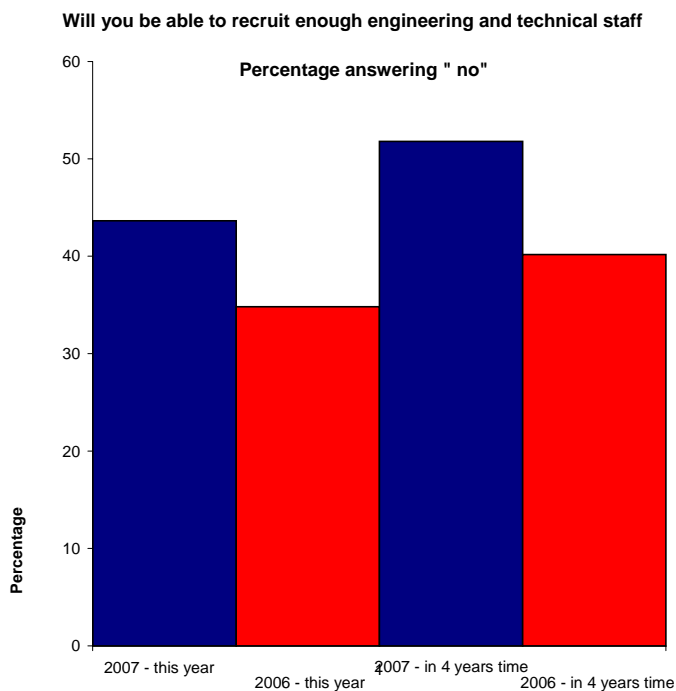
Our 2007 survey puts this figure at 51.8 per cent – over half of our respondents do not believe they will be able to recruit the right number of e&t staff in four years time.

This is in comparison to 43.6 per cent feeling they would have difficulties this year, with 34.8 per cent in answering the same in 2006.

About our sample

This is the second year that the IET has conducted a skills survey within the engineering and technology sector. As in 2006, this survey was carried out on an internet based platform. More than 500 IET business partners and a few other selected groups were polled across a range of industries.

In 2006 we had over a 100 responses from companies of various sizes. In our 2007 survey, our 56 responses contained a higher proportion of large companies responding to what was in effect a more in-depth survey. Comparison of like for like questions across the two years shows strong correlations, and we feel confident that our sample does accurately reflect trends within the sector.

Nearly half of our respondents were part of a non-UK owned company, and just over half were companies with turnovers in excess of £250 million.

Energy topped this years' sector group with just over 28 per cent, with manufacturing and defence coming in second and third.

A fairly broad spread of geographical regions were represented, with London, the South East and North West broadly coming in joint top.

Other sources of information

"Engineering UK" Engineering and Technology Board, (2006)

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.
http://www.etechb.co.uk/research/engineering_uk.cfm

Executive Summary from 2006 Survey

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.

http://www.theiet.org/publicaffairs/education/skills_survey2006.pdf

Institution of Engineering and Technology (The IET): Education and Skills Policy Brief

Prosperity in the 21st century

"A vibrant national innovation system requires a strong supply of scientists, engineers and technologists."
HM Treasury "Lisbon Strategy for Jobs and Growth" October 2005

Science, technology, engineering and mathematics (STEM) skills are vital for a 21st century knowledge economy. Yet this does not always seem to be reflected in schools, education system and Government policies.

These are essential subjects and can offer important skills. We are already facing shortages in key areas – at technician and graduate levels – and the future cannot be with a population without basic STEM skills (already at least 70% of jobs require some IT skills).

IET Education and Skills activities

IET improves education and professional skills in STEM subjects in the following ways:

- **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 IET Faraday** is an interactive programme of events and activities designed to engage 12 -16 year old pupils in science, engineering, technology and maths and enthuse them to take up one of the variety of exciting career opportunities in the profession. Every school in the UK is able participate in this inspiring activity which, including the broadcast on iet.tv, has reached over a million students annually.

- **Continuing Professional Development** (CPD) **Programmes** 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 .
The IET also publishes subject specific education material on www.theiet.org/schools

- **Flipside Magazine** is our teen science and technology magazine, distributed to all secondary schools free. As a "lifestyle magazine" it does not aim to teach or educate, but rather excite and engage - the thread of science and technology runs through each article, be it films and video games or a new gadget.

- **Scholarships:** £400,000 in 2007 for scholarships supporting undergraduates upwards.

Appropriately subject-qualified and trained teachers

We need more science, technology, engineering and maths (STEM) qualified and trained lecturers and teachers at all levels of our education system. Many institutions are facing problems in recruiting new staff and some current staff do not hold appropriate subject qualifications.

Confidence and enthusiasm are essential to teaching, and knowledge and understanding contribute heavily to this. Qualifications are a key indicator as to whether this knowledge is there – although not the only indicator; we believe **flexibility in teacher training courses is vital.**

Teachers and lecturers must be given **opportunities to train and develop** and more STEM qualified teachers **must be recruited**.

Improve Resources and Facilities

Out of date resources and facilities put teachers and lecturers 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.

STEM in particular needs **modern facilities** and **exciting and up to date resources** must be available for all, from primary to FE and HE.

The image of science, technology and engineering

This is extremely important, but there is no quick fix. We all must do more to emphasis the creativity and opportunity STEM offers. **A unified, well funded, approach is needed to really make a difference. Support from across the "STEM Community" is essential.**

Appendix – Survey Questions and results

1. About your company

(a) What would you describe as your core business?

	2007 %	2006 %
Transport	5.5	3.5
Energy (including Utilities, Generation and Nuclear)	28.4	15
IT or Communications	7.3	14.1
Manufacturing	13.8	17.7
Defence	12.8	9.7
Electronics	6.4	8.9
Construction	8.3	8.9
Broadcasting & Media	2.8	n/a
Pharmaceuticals & Health Technologies, or Chemical Industries	2.8	n/a
Other (Please write in)	11.9	22.1

(b) Are you:

	Percentage
A UK owned company with overseas subsidiaries	28.7
A UK owned company with no overseas subsidiaries	22.2
Part of a non-UK owned company	49.1

(c) Which of the following bands does your UK turnover fall in?

	Percentage
Less than £5 million	13.1
£5mil. to £10mil.	6.1
£11mil. to £20mil.	4
£21mil. to £50mil.	9.1
£51mil. to £100mil.	10.1
£101mil. to £250mil.	6.1
Over £250mil.	51.5

(d) Which area is your organisation primarily based in?

	Percentage
North West	13.7
North East	5.3
Yorkshire	6.3
West Midlands	2.1
East Midlands	4.2
East England	2.1
South East England	13.7
London	14.7
South West England	8.4
Wales	7.4
Scotland	2.1
Northern Ireland	3.7
Other	7.4

2. About your staff

(a) What is your total number of employees: (please give your best estimate)

2007	Under10	11 -50	51 -250	251 -500	501 - 1000	1000+
All Disciplines & all UK sites	5.7	5.7	10.2	10.2	5.7	62.5
Engineering and Technical Disciplines & all UK sites	8.1	14.9	13.8	13.8	8.1	41.4

2006	Under10	11 -50	51 -250	251 -500	501 - 1000	1000+
All Disciplines & all UK sites	8	14.3	11.6	17	12.5	36.6
Engineering and Technical Disciplines & all UK sites	13.4	27.7	8.9	17.7	20.5	11.61

(b) Approximately, what percentage of your Total UK workforce is female?

Average was 22.5

(c) Approximately what percentage of your Engineering & Technology UK workforce is female?

Average was 8.1

(d) Over the last 4 years has the number of female applicants for Engineering and Technology jobs:

	Percentage
Increased	21.7
Remained static	49.3
Decreased	10.1
Dont know	18.8

(e) Over the last 4 years, would you estimate that the proportion of female candidates you recruited to Engineering and Technology roles has:

	Percentage
Increased	28.4
Remained static	52.2
Decreased	9
Dont know	10.5

(f) Please give an approximate percentage breakdown of your Engineering and Technician employees by the following age bands:

	2007	2006
Under 30 years	17.6	19.4
30 - 39 years	26.9	31.5
40 - 49 years	30.5	27
50 - 59 years	18.7	16.6
60+ years	6.2	5.5

Your recruitment and skills needs

3. Do you plan to recruit new Engineering and Technologist staff, from the following groups, in 2007?

	2007			2006	
	Yes	No	Don't know	Yes	No
Technician	n/a	n/a	n/a	63	37
School Leavers	39.3	50	10.7	n/a	n/a
Graduates	76.8	16.1	7.1	78	22
Post-Graduates (M Eng, PhD etc)	48.2	30.4	21.4	n/a	n/a
Experienced Staff (Mid Careers)	80.7	10.5	8.7	n/a	n/a

[n/a refers to questions not asked in the respective surveys]

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

2007 [*note they could tick more than one in 2007*]

	Business expansion	Retirement	Staff turnover	Diversifying / developing new areas	Other
School Leavers	38.1	23.8	28.6	7.1	2.4
Graduates	31	22.6	27.4	15.5	3.6
Post-Graduates (M Eng, PhD etc)	30.8	17.3	26.9	21.2	3.9
Experienced Staff (Mid Careers)	32.7	22.1	24	19.2	1.9
Average Per cent overall	33.1	21.5	26.7	15.8	2.9

2006 Totals	32.6	21.6	26.2	16.7	2.8

4. (a) In the previous question you ticked the Other box. Please would you provide some additional detail on why you plan to recruit:

Overall there was not enough data to provide generalised responses, but some of the "others" included "succession planning", "new ventures" and "age profile".

Your Skills Needs

5. Do you find that the typical recruit does not meet your reasonable expectations in any particular skills areas ? Please tick all that apply

	Technical expertise	Practical experience	Literacy skills	Numer-acy skills	Commu nication skills	Leadershi p skills	Ability to work on own initiative	None of These/ Don't Know
School Leavers	14.9	17.2	12.4	9.7	13.1	13.1	13.1	6.9
Graduates	13.5	26	12.6	2.5	12.6	14.3	11.8	6.7
Post Graduates (M Eng, PhD etc)	9	23.9	4.5	1.5	14.9	19.4	6	20.9
Experienced Staff (Mid Careers)	12.7	8.5	8.5	8.5	11.3	23.9	8.5	18.3

6. Are you having to provide additional training to address any knowledge/skills gaps?

Yes	89.5
No	10.5

6. (a) What type of training (eg: mentoring/coaching; specific on the job training) are you providing?

	Frequency ranking – top 5 responses
Technical	**=1**
Mentoring	**=1**
Coaching	**3**
Communication	**4**
Leadership	**5**

6. (b) And which particular groups of recruits are affected?

Graduates came top, with all other groups attracting small numbers as well.

7. How does your company support the Continuous Professional Development of your Engineering and Technology staff? (Please tick all that apply)

Providing resources	71.4
By offering financial support	62.5
Allowing time off for studying	60.7
Encouraging Professional Registration	83.9
Don't know	3.6

8. What programmes and support schemes do you use to provide Continuous Professional Development? (please tick all that apply)

Train to Gain	5.4
IET courses	42.9
Own bespoke courses	67.9
Employees select their own courses	57.1
Dont know	3.6
Other (please detail)	17.9

"Other" group focused on job and company specific training.

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

	2007		2006	
	Yes	No	Yes	No
This year?	56.4	43.6	65.2	34.8
Over the next 4 years?	48.2	51.8	59.8	40.2

10. Why do you expect have difficulty in recruiting suitable candidates:

	Lack of suitably qualified candidates	Shortages or difficulties with specific skills	Unable to offer sufficient salary	Candidates lacked the right experience	Other Reasons
This year?	32.8	36.2	8.6	20.7	1.7
Over the next 4 years?	29	34.8	14.5	20.3	1.5

11. Please detail other reasons for not being able to find suitable staff:

(a) This year?

Single response: location

(b) Over the next 4 years?

Single response: location

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

	Percentage	
	2007	**2006**
Graduate engineers (recently out of university)	39.3 (26.6)	23.1
Senior engineers (5 to 10 years experience)	71.4 (46.5)	55.7
Technicians (non graduate, but includes NVQs)	42.7 (27.8)	21.4

Note: In 2007 respondents were able to choose more than one option. The numbers in brackets are to allow better comparison with 2006.

13. Have you needed to recruit from overseas to find suitable staff to cover specific skills shortages in the past 12 months?

Yes	48.2 Per cent
No	51.8 Per cent

14. Which countries did you recruit from?

	Percentage
The European Union (EU)	44.6
India	17.9
China	12.5
USA	7.1
Other	14.3

In the "other" category, the majority were for South Africa.

15. What actions, either by the IET, the Government, or yourselves do you believe would help resolve any skills shortages you perceive?

	Frequency– top 5 responses
Improve the image and profile of engineering	1
Education and in-school activities	=2
Improving the curriculum and degree content	=2
Grants and fee reductions for technical / engineering courses	=4
Tax incentives for training	=4
Immigration and visa issues (make easier to obtain)	6

16. How did you find out about this survey?

	Percentage
From a Business Partners email	77.1
From a link in an IET magazine	20.8
From another source	2.1

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