



DEBATE PACK

Number CDP 2016/0066 , 11 March 2016

Engineering skills and design and technology education

Summary

On Tuesday 15 March there will be a debate on Engineering skills and design and technology education in Westminster Hall at 9.30am. Michelle Donelan MP will lead the debate.

This Debate Pack provides a background briefing and statistics, press and parliamentary coverage of the issues and suggested further reading.

The House of Commons Library prepares a briefing in hard copy and/or online for most non-legislative debates in the Chamber and Westminster Hall other than half-hour debates. Debate Packs are produced quickly after the announcement of parliamentary business. They are intended to provide a summary or overview of the issue being debated and identify relevant briefings and useful documents, including press and parliamentary material. More detailed briefing can be prepared for Members on request to the Library.

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1. Background

The opening sections to this pack provide background information on measures to promote engineering within the broader framework of science, technology, engineering and mathematics (STEM), and also issues in design and technology education.

1.1 STEM education in schools

A variety of measures and programmes are in place to encourage the take-up of science, technology, engineering and mathematics (STEM) subjects.

Careers guidance in schools

Local authority maintained schools are subject to a statutory duty to provide impartial careers guidance to pupils in years 8 to 13 (ages 12-18). Many academies and free schools are subject to the duties relating to careers guidance through their funding agreements; those which do not are encouraged to follow this guidance in any case as a statement of good practice.

Statutory [guidance](#) on the duty, published by the Government, emphasises the opportunities offered by the study of STEM subjects:

Schools should ensure that pupils are exposed to a diverse selection of professionals from varying occupations which require STEM subjects, and emphasise in particular the opportunities created for girls and boys who choose science subjects at school and college. Schools should be aware of the need to do this for girls, in particular, who are statistically much more likely than boys to risk limiting their careers by dropping STEM subjects at an early age.¹

Government STEM initiatives in schools

STEMNET

The Government provides funding of £6.3 million per year to [STEMNET](#) to run a number of programmes, including the STEM Ambassadors programme. STEMNET works with children of all ages. The Ambassadors programme is a network of 28,000 volunteers from industry and academia who visit schools, illustrating STEM careers and advising teachers. Over 40% of the ambassadors are women.²

More information is available on the STEMNET website at [About Us](#).

Big Bang Fair

The Big Bang Fair is a 'celebration of science, technology, engineering and maths (STEM) for young people in the UK.' It aims to show young

people aged 7-19 the ‘opportunities out there for them with the right experience and qualifications’. It also hosts national competitions, including for title of UK Young Scientist and UK Young Engineer of the Year. More information is available on the Big Bang Fair website at [About us](#).

Your Life Campaign

The Government launched the [Your Life campaign](#) in 2014, and spent £600,000 on Your Life activity in 2014-15. The campaign is now independently run and funded.³

Your Life is a three year campaign that aims to increase the number of pupils taking A Level physics and maths.

An [article](#) in Times Higher Education from 8 May 2014 provides information on some of the supporting activities higher education institutions (HEIs) are undertaking.⁴

Other activities

The Government also provides funding to other initiatives, including:

- £2.1 million to the [Stimulating Physics Network](#) in 2014-15.⁵ The network aims to increase the number of students progressing to A Level physics. More information about the work of the network is available on its website at, [About Us](#).
- £5 million to the [Further Mathematics Support Programme](#) in 2014-15. The Programme aims to increase the number of students studying A Level Mathematics and Further Mathematics.⁶

English Baccalaureate

The English Baccalaureate (EBacc) is a performance measure for schools in England, first applied in the 2010 school performance tables. It measures the achievement of pupils who have gained Key Stage 4 (GCSE level) qualifications in the following subjects:

- English
- mathematics
- history or geography
- the sciences; and
- a language

The Conservative manifesto for the 2015 General Election proposed that the English Baccalaureate be made a requirement for English schools. In June 2015 the Government announced that pupils beginning Year 7 in September 2015 will study the EBacc at GCSE level, meaning they would take their GCSEs in those subjects in 2020.

In November 2015 the Government published a consultation setting out the aim that at least 90% of pupils in mainstream secondary schools

³ [PQ3583](#), 25 June 2015

⁴ [‘Women in STEM campaign aims to bridge gender gap’](#) in *Times Higher Education (Online)*, 8 May 2014.

⁵ [PQ3583](#), 25 June 2015

⁶ [PQ3583](#), 25 June 2015

should be entered for the EBacc, and seeking views on implementation. The consultation was open until 29 January 2016.

Concerns have been raised about the impact of the strengthened EBacc on subjects which are not included in the measure, such as Design and Technology.

The [Library briefing on the EBacc](#) provides more detail.

1.2 STEM in further and higher education

Further education

A report by the 157 Group and the Gatsby Foundation, [The challenges of Stem provision for further education colleges](#), discusses STEM provision in FE colleges and said that the FE sector plays a vital role in delivering STEM education:

The FE Stem data project found that FE offers almost 2,500 Stem-related qualifications and in 2009/10, 1.74 million Stem qualifications were achieved by individuals aged 16 and over in the English FE and skills sector.

1.3 STEM education in universities and colleges

Government STEM initiatives in higher education

The Higher Education Funding Council for England (HEFCE) distributes funding to higher education institutions (HEIs), it also monitors and where necessary supports specific subjects which are considered to be [strategically important and vulnerable subjects \(SIVS\)](#). As part of this work HEFCE supports [science, technology, engineering and mathematics \(STEM\)](#) subjects. This support takes the form of direct funding for the delivery of STEM courses and support through specific initiatives such as Sigma - project to support mathematics and statistics:

Sigma

HEFCE is providing just over £800,000 to support [sigma](#), a network to promote mathematics and statistics support across the country.

Students across a wide range of subjects need skills in mathematics and statistics. For some subjects these skills and career plans are more central than others.

The sigma project has:

- supported the development of maths 'drop-in' centres
- developed resources for use across the network
- provided staff training
- provided a platform through six regional hubs for the sharing of experience and practice.

A 2012 report by the House of Lords Science and Technology Committee, [Higher Education in Science, Technology, Engineering and Mathematics \(STEM\) subjects](#), provides further information on HEFCE's work in ensuring a supply of STEM graduates (pages 36-38).

Relaxation of ELQ rules for STEM subjects

In general, individuals studying for a qualification that is equivalent to, or lower than a qualification they already hold (ELQs) are not entitled to tuition fee loans or maintenance loans. However, in September 2013, the Department for Business, Innovation and Skills (BIS) announced a partial relaxing of the ELQ rules so that from August 2015 students would be able to access fee loans to study part-time for degrees in engineering, technology and computer science.⁷ An [information note](#) published by Student Finance England explains the changes.

In the Autumn Statement 2015, the Government announced that from 2017-18 the ELQ exemption would be extended so that students wishing to do a part-time second degree in a wider range of STEM subjects would be eligible for tuition loans.⁸

Recruitment of STEM teachers

The Government has for some time encouraged graduates to take up teaching in STEM subjects, through the use of financial incentives such as PGCE bursaries. STEM graduates get the highest level of bursary for initial teacher training. A document by the National College for Teaching and Leadership [Initial teacher training bursary guide academic year 2015/16](#) states that trainee teachers in England with a 1st class degree, or a PhD in physics, chemistry, mathematics or computing course are eligible for a bursary of £25,000. The bursary for a trainee teacher in physics with a 1st class degree or a PhD will go up to £30,000 in 2016/17.

Further information on initiatives to encourage the recruitment of teachers in STEM subjects is provided in section 2 of Library Briefing Paper 7222, [Teachers: supply, retention and workload](#).

Other Government STEM initiatives

Many of the Government's initiatives to encourage students to study STEM subjects are aimed at promoting the STEM disciplines in schools rather than at university level. The rationale behind this is that this will create a flow of students into higher education – a 'STEM pipeline'.

Some of these STEM schemes were referred to by the then Universities Minister, David Willetts, in response to a parliamentary question in 2013 asking what the Government was doing to encourage students to study science and engineering at university:

Science: Higher Education

Eric Ollerenshaw: To ask the Secretary of State for Business, Innovation and Skills what steps he is taking to encourage students to take up science and engineering degrees at university.
[162183]

⁷ Department for Business, Innovation and Skills Press Release, [£400 million will help science and engineering students get ahead in the global race and encourage more women to study these subjects](#), 30 September 2013.

⁸ HM Treasury, [Spending Review and Autumn Statement 2015](#), Cm9162, November 2015, p47

Mr Willetts: The Government fully recognise the importance of science, technology, engineering and maths (STEM) based industries to the UK economy, and of maintaining a healthy STEM pipeline. This is why we continue to sponsor a range of initiatives which aim to engage young people in STEM at various points in their educational career, including at degree level. Examples of these initiatives include the STEMNET STEM ambassador programme, the national science and engineering competition and the Big Bang Fair.

We are also working to increase the number of young people choosing to study these subjects by promoting diversity within STEM. The Government fund the Royal Society and Royal Academy of Engineering to run a programme of work aimed at identifying and removing the barriers to entering STEM through a range of routes, including university.

We are also supporting higher level study of STEM subjects through the Higher Education Funding Council for England (HEFCE). Subjects which are identified as strategically important or vulnerable subjects (SIVS) receive additional financial support from HEFCE to help ensure courses can be continued. A range of STEM subjects are currently classed as SIVS.

In the spending round 2013, the Chancellor of the Exchequer announced that he would:

- maintain resource funding for science in cash terms at £4.6 billion in 2015-16;
- increase capital funding in real terms from £0.6 billion in 2012-13 to £1.1 billion in 2015-16;
- and set a long-term capital budget for science in the next Parliament growing in line with inflation to 2020-21⁹

Institutional initiatives to encourage the study of STEM subjects

Scholarships for STEM undergraduates

Many HEIs offer scholarships to high achieving students wanting to study STEM subjects, for example Queen Mary University of London and Sheffield University offered £3,000 to UK students pursuing STEM-related (science, technology, engineering and mathematics) subjects with at least three As at A-level. Information on scholarships and awards can be found on individual university websites.

Brunel University runs a [Women in Engineering programme](#) this scheme is to encourage women to take up masters degrees in engineering – the scheme includes mentoring, professional development training and £10,000 award.

University outreach work

Many universities run summer schools and other outreach events for young people as part of their widening participation strategies. Numerous universities for example [Leicester](#), [Royal Holloway](#), [Birmingham](#) offer specific science events for school pupils such as

⁹ [HC Deb 1 July 2013 c522W](#)

workshops, lectures and master-classes as a way of encouraging students to consider studying STEM subjects.

Universities also work with many other scientific outreach and educational bodies for example the [Engineering Development Trust](#) in England.

Development of STEM degrees

Degrees for students without science qualifications

Many universities have developed flexible STEM degrees for students without science qualifications. These degrees may be foundation degrees, or include an integrated foundation year; such courses give students extra support to help them to progress to a full science degree. An example of this type of course can be seen on the website of the [University of Swansea](#).

The Open University offers a degree called [OpenPlus](#) which allows students to start a science degree by part-time study at the OU and finish by studying for two years full-time at a partner university. This flexible approach is cheaper than other degrees and can be taken by students without science qualifications.

Flexible degrees

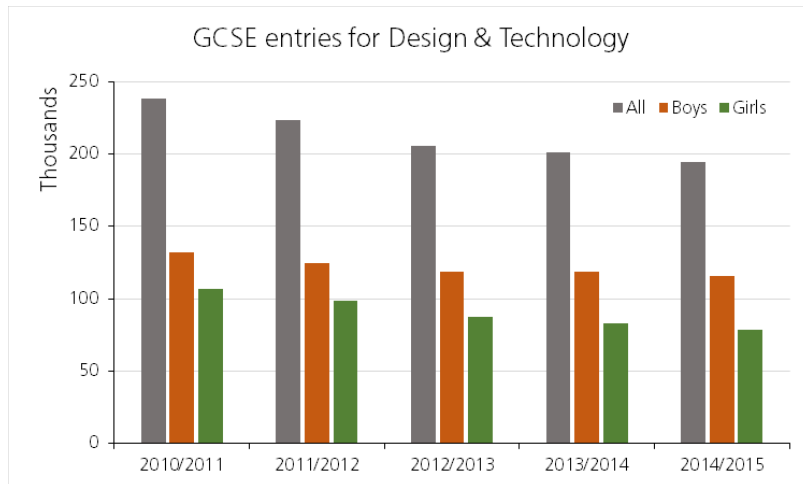
The [University of Leicester](#) has developed flexible major/minor degrees which allow students to combine studying arts and science subjects in a degree course.

The [Professional Pathway scheme](#) at City University allows students studying mathematics, computer science or engineering, to transfer to four-day-a-week employment after a period of study and complete their degree by a combination of day-release and e-learning.

1.4 Statistical information

GCSE

Entries for Design & Technology (D&T) subjects at GCSE have declined by 18% between 2010/11 and 2014/15, from just under 240,000 to just under 195,000. This decline has been even more pronounced amongst girls, amongst whom entries fell by 26% (compared to 12% for boys) over this five year period.



2014/15 figures are revised, all other years are final.

Within Design & Technology, the number of entries in some subjects have fallen faster than others, particularly Systems & Control and Food Technology. The number of entries for Other D&T¹⁰ have risen over the five years (although only amongst boys).

The table below shows this subject breakdown, as well as the gender breakdown of entries by subject. Food Technology and Textiles Technology have a higher proportion of girls taking the subjects, although all other D&T subject entrants are made up of at least 63% boys.

| D&T Subject | Total 2014/15 entries | % change on 2010/11 entries | % of 2014/15 entries by gender | |
|----------------------|-----------------------|-----------------------------|--------------------------------|------------|
| | | | Boys | Girls |
| Electronic Products | 7,895 | -20% | 93% | 7% |
| Food Technology | 38,416 | -29% | 37% | 63% |
| Graphic Products | 31,859 | -27% | 63% | 37% |
| Resistant Materials | 51,096 | -13% | 85% | 15% |
| Systems & Control | 2,979 | -31% | 94% | 6% |
| Textiles Technology | 24,198 | -28% | 3% | 97% |
| Other D&T | 38,207 | +11% | 72% | 28% |
| Total D&T | 194,650 | -18% | 60% | 40% |

Although the numbers involved are much smaller, GCSE entrants for applied engineering have risen almost five-fold over the five years, from 1,300 to 6,290. 92% of the 2014/15 entrants were boys.

Source: DfE, [Revised GCSE and equivalent results in England: 2014 to 2015](#)

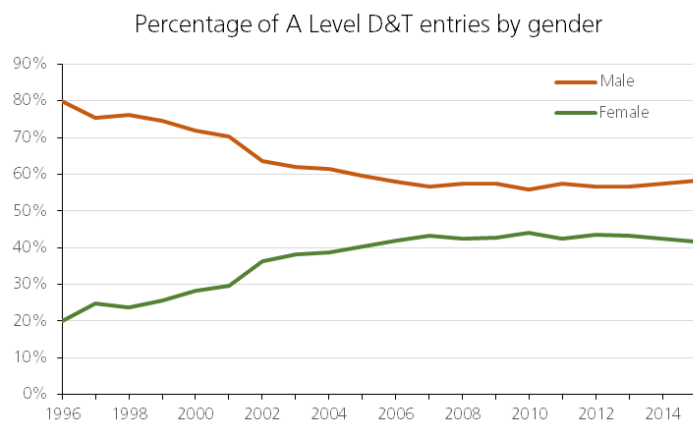
A Level

Between 2010/11 and 2014/15, the number of A Level entrants for Design & Technology fell by 24%, from just under 14,900 to just over

¹⁰ Other D&T: Graphics, Motor Vehicle Studies, Design & Technology, D&T Engineering, D&T Product Design

11,300. Male entrants fell by 23% over the five year period, whilst female entrants fell by 25%.

This has led to a slight increase in the gender gap amongst entries over these five years, although this is a small part of a longer term trend which has seen the gap fall from 60% in 1995/96 to 16% in 2014/15 (reaching a low of 12% in 2009/10).



2015 figures are based on revised data. Figures for all other years are final.

Source: DfE, [A level and other level 3 results: 2014 to 2015 \(revised\)](#)

Teachers

All school workforce census figures are rounded to the nearest 100.

As of November 2014, there were 12,700 Design & Technology teachers and 1,600 engineering teachers in state-funded English secondary schools. In headcount (as opposed to full-time equivalent) terms, this is 5.5% and 0.7% of all teachers respectively.

Compared to November 2010, the number of D&T teachers has fallen by 2,300 but the number of engineering teachers has risen by 100. The breakdown by subject and key stage is shown in the table below.

| Headcount of in service teachers by subject (thousands), November 2014 | | | | |
|---|-------------|-------------|-------------|-------------|
| | Total | Key Stage 3 | Key Stage 4 | Key Stage 5 |
| Design & Technology | 12.7 | 5.7 | 10.3 | 3.3 |
| Electronics / Systems & Control | 1.0 | 0.4 | 0.7 | 0.2 |
| Food Technology | 4.7 | 2.4 | 3.5 | 0.7 |
| Graphics | 3.3 | 1.1 | 2.4 | 0.9 |
| Resistant Materials | 4.0 | 1.6 | 3.0 | 0.5 |
| Textiles | 2.9 | 1.1 | 2.1 | 1.1 |
| Engineering | 1.6 | 0.3 | 1.2 | 0.6 |

In November 2014, there were 100 D&T teacher vacancies – 1.1% of D&T teachers in post. This has risen from 0.4% in November 2010, although this is an identical rise to all secondary school vacancies as percentage of teachers in post over the same period.

Between 2010 and 2014, the total number of D&T teaching hours has fallen by 16%, from 119,900 to 100,300. Total engineering teaching hours however have risen by 19%, from 8,400 to 10,000.

Source: DfE, [Statistics: School Workforce](#)

Further Education & Apprenticeships

In 2014/15 there were just under 400,000 vocational certificates in engineering and manufacturing technology issued in England, Wales and Northern Ireland. This is 4% lower than the figure for 2010/11, but 78% higher than 2005/06.

<Caption>

| Number of vocational certificates in Engineering & Manufacturing Technology, (England, Wales & N Ireland) | | | | | | | | | |
|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/12 | 2013/14 | 2014/15 |
| 224,450 | 261,100 | 318,400 | 385,900 | 395,950 | 417,600 | 416,100 | 439,900 | 401,050 | 399,650 |

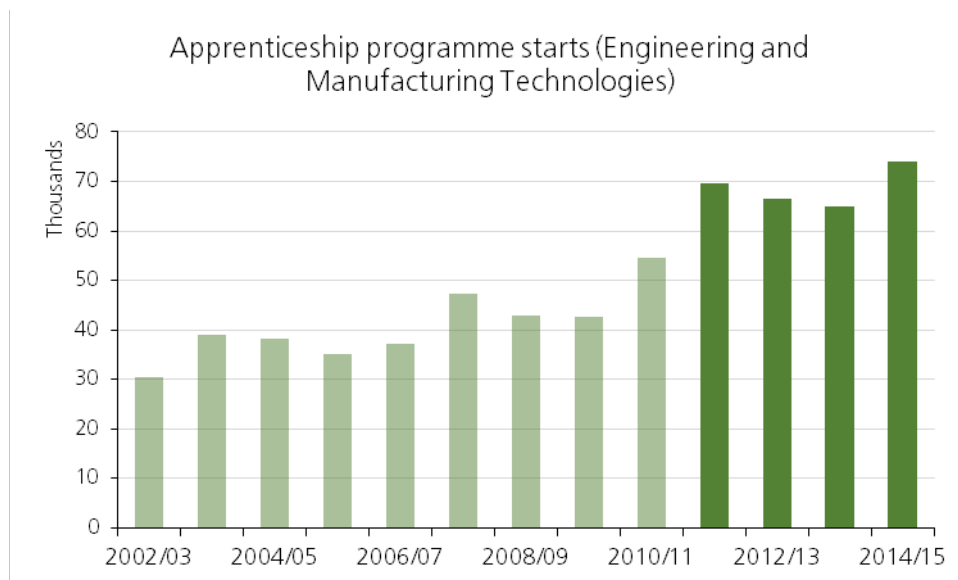
Since 2006/07, engineering and manufacturing technology certificates have made up approximately 5% of all vocational certificates issued.

Of these certificates, around half were for engineering subjects, around a third were for manufacturing technologies subjects and around a quarter were for transport operations and maintenance subjects.

Source: Ofqual, [Vocational and Other Qualifications Quarterly](#)

For 2014/15 there were 74,060 apprenticeship starts in the engineering and manufacturing technology sector. This is the highest figure of all comparable years (going back to 2011/12). Figures prior to 2011/12 are not comparable with recent years.

Between 2002/03 and 2010/11, the number of apprenticeship programme starts rose by 79%.



Source: Skills Funding Agency/ BIS, [FE data library: apprenticeships](#)

2. Press articles

The Guardian, February 16, 2016

[Is art education running out of Steam?](#)

[More than a third of teachers say they have had less time to teach art and design over the past five years – a holistic approach that brings science, technology, engineering, art and maths together is key](#)

telegraph.co.uk, February 5 2016

[Kids don't like physics and maths: study finds out why;](#)

[Britain will face a shortage of engineers, scientists and mathematicians within the next few years unless more pupils are encouraged to take up the subjects at school](#)

Times Educational Supplement, January 22, 2016

[Institutes of technology 'should be within existing colleges'](#)

telegraph.co.uk, December 16 2015

[How do we tackle the STEM skills gap?;](#)

[There are other countries facing STEM skills shortages; we could learn from their initiatives to address the issue in this country](#)

Independent.co.uk, October 17 2015

[Students are being failed by system that steers them away from sciences, campaigner warns;](#)

[Edwina Dunn, chair of the Your Life education initiative says action is needed to prevent an 'education emergency'](#)

Times Educational Supplement, August 21 2015

[Re-engineering how girls see Stem](#)

Times Educational Supplement, May 1 2015

[Engineering a solution to the gender imbalance](#)

telegraph.co.uk, 26 February 2014

[UK universities facing tough global competition in STEM subjects](#)

Guardian, 10 April 2014

[Number of students studying Stem courses in UK at record high](#)

Full text of these articles may be obtained from the Library.

3. Press release

Association of School and College Leaders

[\(ASCL\)ASCL says national plan for recruitment and training of new teachers is needed to stem shortfall](#)

30 October 2014

In response to the report issued by Universities UK today (Thursday) into delivery of teacher training, ASCL Deputy General Secretary Malcolm Trobe said:

“ASCL has been raising concerns for more than a year over teacher recruitment. While the system is working in places, a significant number of schools say they are having real issues recruiting suitable applicants. The shortfall is serious and although the report highlights STEM subjects, we know there is an issue across a wide range of subjects including English and maths.”

“Although the previous system wasn’t perfect, one advantage it did have was an overall plan to ensure that there were enough teachers coming through in every subject. The problem now is that there is no overall picture of recruitment and retention. Going forward, there needs to be a coordinated plan for recruitment that can anticipate demand for teachers in specific subjects or regions of the country.

“The way forward is to have groups of schools working in close partnership with universities to train the next generation of teachers. Teaching is a science as well as an art and it requires a body of knowledge and theory alongside practical, on-the-job training.

“Universities have an important role in working with schools to make sure that teachers understand how to use evidence to develop their teaching, and are encouraged to conduct their own research as they go through their careers. This is the hallmark of a self-improving system.”

4. Parliamentary questions, statements and debate

PQs

[STEM Subjects: Females](#)

Asked by: Howlett, Ben

To ask the Secretary of State for Education, what steps she is taking to secure the appropriate data to monitor the progress of programmes which encourage the uptake of STEM subjects by girls.

Answering member: Nick Gibb

The Government funds a number of programmes which encourage the uptake of Science, Technology, Engineering and Mathematics (STEM) subjects by girls. We monitor the progress of these programmes against their key performance indicators through regular reports and by evaluating their impact.

In 2014 the Government published for the first time data showing the proportion of girls and boys studying A levels in science and maths at each post-16 institution, and in 2016 time series data of students entered for mathematics and science A level subjects by number of subjects and gender. Both sets of data will continue to be published on an annual basis.

08 Mar 2016 | Written questions | 28886

[Topical Questions](#)

Asked by: Michelle Donelan (Chippenham) (Con)

Will my hon. Friend please join me in recognising the vastly improved design and technology GCSE, which comes into play next year and which will help to inspire the next generation

Answered by: Mr Gibb

Yes, we have made some significant reforms to the D and T GCSE and A-level, working closely with the Design and Technology Association and the James Dyson Foundation to ensure we have high-quality D and T qualifications that lead on to higher education, apprenticeships and high-quality employment in the sector. I hope the qualification itself will lead to more young people taking it.

07 Mar 2016 | Topical questions - 1st Supplementary | Answered | House of Commons | 607 c19

[Higher Education: STEM Subjects](#)

Asked by: Stephen Metcalfe (South Basildon and East Thurrock) (Con) y

What steps he is taking to increase the participation rate in STEM subjects in higher education.

Answered by: The Minister for Universities and Science (Joseph Johnson)

Record numbers of students secured places on science, technology, engineering and maths courses this year at our universities, and thanks to the decision we have taken to end student number controls, there is no longer any cap on the number of people wishing to study STEM subjects. The number of full-time students accepted to study STEM subjects in England is up 17% since 2010.

02 Feb 2016 | Oral questions - Lead | 903374 | 605 cc765-6

[Higher Education: STEM Subjects](#)

Asked by: Stephen Metcalfe

Will my hon. Friend join me in celebrating the work and role science and discovery centres play in inspiring young scientists and engineers? Will he tell the House what plans he has to improve their reach, raise awareness of their existence and support their important work?

Answered by: Joseph Johnson

I certainly will. Our science centres do a fantastic job engaging with over 20 million people each year. That complements the work we are doing to boost STEM subjects in schools. Last week I was delighted to announce a £30 million Inspiring Science capital fund in partnership with the Wellcome Trust. It will allow science centres to make big investments in cutting edge exhibitions and education spaces, and reach all sorts of people who think science is not for them.

02 Feb 2016 | Oral questions - 1st Supplementary | 605 c765

[STEM Subjects: Higher Education](#)

Asked by: White, Chris

To ask the Secretary of State for Business, Innovation and Skills, what steps he is taking to increase participation in part-time higher education courses in STEM subjects.

Answering member: Joseph Johnson

This year we relaxed the Equivalent and Lower Qualification (ELQ) rule for part time students taking engineering, technology and computer science courses. This means that students who already hold a degree will be able to access student support. At the Autumn Statement we announced a further relaxation to the eligibility rules so that students who already hold a degree can from 2017/18 access student support for part time study of other STEM subjects. These changes do not affect those undertaking full time study.

10 Dec 2015 | Written questions | 18937

[STEM Subjects: Females](#)

Asked by: Howlett, Ben

To ask the Secretary of State for Education, what assessment she has made of the effect of the introduction of statutory PHSE on the uptake of STEM subjects by girls.

Answering member: Edward Timpson

Through the introduction to the national curriculum, the Government has made clear that all schools should make provision for Personal, Social and Health Education (PSHE). PSHE is, however, a non-statutory subject.

The Government is determined to increase the number of young people studying Science, Technology, Engineering and Maths (STEM) subjects, particularly girls. There have been 12,000 more A Level entries in STEM subjects for girls over the last five years.

PSHE plays an important part in preparing young people for the world of work including dispelling gender stereotyping. Resources to support PSHE include those produced by Siemens in collaboration with the PSHE Association. These resources explore equality and the world of work which aim to inspire the next generation of female scientists, technicians and engineers.

We are also supporting schools in other ways to tackle this issue through professional development and enrichment activities, including the Stimulating Physics Network, and the inspiring "Your Life" campaign, which will transform perceptions of science and mathematics.

02 Dec 2015 | Written questions | 17786

[Teacher Recruitment](#)

Asked by: John Pugh (Southport) (LD)

Recent Government figures show that there is a 50% recruitment shortfall in design and technology. Is not there a case for urgent and special attention?

Answering member: Mr Gibb

We continue to offer bursaries for graduates coming into teaching design and technology. We have also revised the curriculum, which we believe has made it a more attractive and rigorous qualification. The number of students taking it at GCSE and A-level has been falling over a number of years, and to tackle that we have improved the qualifications in that subject. That should follow through into more people becoming graduates in those subjects and moving into teaching.

30 Nov 2015 | 603 c15

[STEM Subjects: Graduates](#)**Asked by:** Lord Wills

To ask Her Majesty's Government what assessment they have made of the number of science, technology, engineering, and mathematics graduates who were not in education or employment one year after graduation, in each of the last five years.

Answering member: Baroness Evans of Bowes Park

The Higher Education Statistics Agency (HESA) collects and publishes statistics on the destinations of leavers from UK Higher Education Institutions six months after graduation. The information requested is provided in the table.

UK Domiciled full-time first degree leavers from Science, Technology, Engineering and Mathematics Subjects (STEM)[1] not in employment or further study 6 months after graduation[2][3][4]

| | 2009/10 | 2010/11 | 2011/12[5] | 2012/13 | 2013/14 |
|---|---------|---------|------------|---------|---------|
| Percentage not in employment or further study | 8.9% | 8.7% | 8.4% | 7.2% | 6.2% |
| Base Population | 81,290 | 85,595 | 87,910 | 95,390 | 101,465 |

[1] STEM subjects are defined by HESA as Subject Groups A to K under the JACS3 classification. Further information can be located at this link <https://www.hesa.ac.uk/component/content/article?id=1787>.

[2] Figures are taken from Supplementary Table SE1 of HESA's Performance Indicators (<https://hesa.ac.uk/pis/emp>)

[3] Statistics are expressed as a percentage of UK domiciled graduates who were working, studying or seeking work.

[4] In this table 0, 1, 2 are rounded to 0. All other numbers are rounded up or down to the nearest 5.

[5] Due to changes on the DLHE questionnaire in 2011/12 and hence changes to the derivation of the activity categories, the employment indicator for 2011/12 onwards is not strictly comparable with the indicator prior to 2011/12.

12 Nov 2015 | Written questions | HL3017

[STEM Subjects: Graduates](#)**Asked by:** Lord Wills

To ask Her Majesty's Government what action they are taking to increase the number of science, technology, engineering, and

mathematics graduates in education or employment one year after graduation.

Answering member: Baroness Evans of Bowes Park

The Government attaches great importance to the supply of science, technology, engineering and mathematics skills and the value that they bring to all sectors of our economy. It has commissioned two independent reviews into graduate employment and accreditation in STEM which aim to explore some of the issues around the employment outcomes of graduates from STEM disciplines.

Sir William Wakeham is leading the review into STEM disciplines. A second, separate review is being led by Sir Nigel Shadbolt and is considering the specific concerns related to graduates of Computer Science. [HL3019]. The reviews are due to report to Ministers in Winter 2015/16. (Note: further information can be found at <http://www.hefce.ac.uk/kess/gradstemreview/>)

09 Nov 2015 | Written questions | HL3019

[Creative Sector: Educational Provision](#)

Asked by: Lord Baker of Dorking (Con)

Is my noble friend aware that schools up and down the country are reducing their curriculum very significantly in order to concentrate on the academic subjects included in the EBacc? That is the case not only in the arts and culture; virtually all technical studies below the age

of 16 have now disappeared in our schools. In design and technology, an important subject introduced into the curriculum in 1988, the numbers have fallen in each of the last five years both for GCSE and at A-level. What our students need in most of our schools is a much wider range of studies.

Answered by: Lord Nash

One has to look back to where we have come from. Under the Labour Government, the number of pupils studying a core suite of academic subjects collapsed from 50% to 22% as the Labour Government perpetuated the scandal of equivalents. I make no apologies for the EBacc. We are now back to 39% of pupils taking these core subjects which are acknowledged to give pupils, particularly those from disadvantaged backgrounds, the cultural capital that they need.

22 Jul 2015 | Oral questions - Supplementary | 764 c1110

[STEM Subjects: Teachers](#)

Asked by: Haigh, Louise

To ask the Secretary of State for Education, what assessment she has made of levels of supply and demand for qualified teachers in STEM subjects.

Answering member: Nick Gibb

The Department for Education uses the Teacher Supply Model (TSM) to estimate the demand for the number of qualified teachers in active service within state-funded schools in England. To estimate the demand for teachers in specific subjects (including STEM), the TSM uses the latest data on secondary subject take-up and projected pupil numbers at Key Stages 3 to 5. It also accounts for the different age and gender demographics of the teacher stock in each subject (which affect the likelihood of teachers leaving the stock or retiring). We monitor the current supply of teachers using the annual School Workforce Census. The current supply and future demand for qualified teachers as estimated by the 2015/16 TSM along with a user guide explaining the methodology in detail is published online at:

www.gov.uk/government/publications/teacher-supply-model

The department also monitors the current supply of teachers (including STEM teachers) using data on full-time classroom teacher vacancies in secondary schools by subject. In 2013, the vacancy rate was 1.1% for mathematics, 1.0% for the sciences, 0.6% for design and technology, and 1.0% for information technology. Data on vacancies for other subjects and historical vacancy rates for STEM subjects are available in Table 15 in the main tables of the school workforce statistical first release, published online at:

www.gov.uk/government/statistics/school-workforce-in-england-november-2013

10 Jun 2015 | Written questions | 849

Statements

[Publication of reformed GCSE and A level content](#)

Nick Gibb (Minister of State for Schools)

The government is reforming GCSEs and A levels to be rigorous and more knowledge-based and to match the qualifications used in the best education systems in the world.

Schools are now teaching some of the new reformed GCSEs and A levels, and we have already published reformed subject content for those GCSEs and A levels to be taught from September 2016. Content for reformed GCSE subjects can be found [here](#) and content for AS and A level subjects [here](#).

The new GCSEs will be more academically demanding and will be qualifications that command the confidence of students, employers, and further and higher education institutions. At A level, our reforms aim to ensure that they prepare students for undergraduate study and the world of work.

Today I am publishing revised subject content for some of the GCSEs and AS and A levels that will be taught in schools from September 2017:

- GCSEs in astronomy, business, economics, engineering, geology and psychology; and
- AS and A levels in environmental science, design and technology, music technology and philosophy.

The astronomy GCSE requires greater depth of knowledge, for example by expanding topic areas such as the evolution of the stars. The content has also been brought up to date to reflect the latest knowledge, and the mathematical requirements are more demanding.

The business GCSE content has added breadth and depth with new requirements to understand business decision-making in more detail, including business growth and development.

The new economics GCSE content is more demanding and includes detailed requirements for specific mathematical knowledge. All students will now be required to understand more of the essential concepts of economics, and depth and breadth have been increased by adding a number of new topics.

The engineering GCSE has increased demand through a greater emphasis on systems-related content and requiring additional mathematical knowledge. A detailed section on testing and investigation has been introduced which includes content such as predicting performance through calculations, simulations and modelling.

Environmental science AS and A level requires students to know and understand the science behind environmental issues and, in line with other reformed science A levels, to use scientific theories, models and ideas.

The new geology GCSE content has increased demand by requiring increased mathematical knowledge, and the study of new content on planetary geology and a greater number of minerals, rock types and fossil groups. Fieldwork remains a fundamental part of the subject, with students required to spend at least two days engaged in fieldwork.

In music technology AS and A level content, students are now required to develop an in-depth knowledge of the principles of sound and audio technology and the development of recording and production technology. Recording and production techniques for both corrective and creative purposes are also included.

Philosophy AS and A level content will enable students to gain a thorough grounding in key philosophical questions and concepts. Students are required to study the ideas of key philosophers.

Psychology GCSE content will require all students to study five compulsory topics (development; memory; psychological problems; social influence; and the brain and neuropsychology) and two optional topics. The study of these is underpinned by the study of key theories

and all students will be required to develop a strong understanding of research methods, including quantitative analysis.

The new design and technology A level will require all students to study the iterative design processes and technical principles that are at the core of contemporary design practice. There will be options in design engineering, product design and fashion textiles to allow students to specialise. Students will also undertake a substantial design and make task at A level.

17 Dec 2015 | Written statements | House of Commons | HCWS430

[Education reform: Revised design and technology GCSE content](#)

Nick Gibb (Minister of State for Schools)

We are reforming GCSEs to make sure that they give students the best possible preparation for further and higher education, and for employment. We want new GCSEs to set expectations which match those of the best education systems in the world, with rigorous assessment that provides a reliable measure of students' achievement. The reforms are extensive and represent a new qualification gold standard.

Today, I am publishing subject content for Design and Technology GCSE, for first teaching in 2017. This follows a public consultation which ran from 1 July 2015 until 26 August 2015. The new content moves the subject on from its craft based roots into a cutting edge qualification focused upon both design and making, that will better prepare students for further study and careers.

The content emphasises the iterative design processes that all students should understand and be able to demonstrate and which is at the core of contemporary practice. It will allow both breadth and depth of knowledge, without limiting students on the materials they can work with, enabling them to make choices appropriate to their design, rather than creating a design around a particular material.

The new GCSE also sets out in greater detail the mathematical and scientific content that students must know and understand in relation to design and technology.

These changes aim to ensure that all students have the knowledge and skills to design and make prototypes, using the best material, equipment and techniques, to solve real world and relevant problems across a range of contexts.

The new GCSE in Design and Technology will be introduced for first teaching in September 2017.

The GCSE content document, and the Government's response to the consultation are attached to this statement.

04 Nov 2015 | Written statements | House of Commons | HCWS290

[GCSE and A level subject content consultation](#)

Nick Gibb (Minister of State for Schools)

Today I am launching a public consultation on revised subject content for seven GCSEs and five A levels which will be taught from 2017.

This represents an important step in the third phase of GCSE and A level reform. Our aims for GCSE and A level reform are unchanged. We are reforming GCSEs and A levels to be rigorous and more knowledge-based and to match the qualifications used in the best education systems in the world. The reforms aim to ensure that GCSEs are more academically demanding and will be qualifications in which students, employers, and further and higher education institutions can have confidence. At A level, our reforms aim to ensure that they prepare students for undergraduate study. A priority in the development process has therefore been to secure the views of subject experts, particularly university academics in the relevant subjects.

The subject content documents being published today set new expectations which all awarding organisations' specifications must meet. Awarding organisations have drafted content, working with Department for Education and Ofqual. An additional consultation will be published in the autumn with content for the remaining subjects to be taught from September 2017.

This consultation is an opportunity for teachers, further and higher education colleges, parents and students, industry and all those with an interest in these subjects to provide their views and allow us to take them into account when redrafting the content for final publication.

Summary of changes to subjects

Astronomy GCSE has been reformed to ensure it has the same level of demand as the newly reformed GCSE science content. Demand has been increased by introducing new areas of knowledge and placing greater emphasis on students' use of mathematical skills.

The business GCSE content increases breadth and depth of knowledge, and introduces more focus on the overall purpose of business, on how the different parts of a business work together, and on how business decisions are made.

The new economics GCSE content has been significantly strengthened and focuses clearly on economics as a social science, with additional depth added such as requiring students to understand movements along, and shifts in, supply and demand curves, and with more demanding mathematical requirements.

The engineering GCSE has an increased level of demand with a greater emphasis on systems-related content, a detailed section on testing and investigation, and new and more demanding mathematics.

Environmental science A level has been brought in line with other reformed science A levels, and requires greater scientific knowledge, understanding and skills.

The new geology GCSE content requires students to study a greater number of minerals, rock types and fossil groups, and there is new content on planetary geology.

History of art AS and A level content will ensure students study a wide range of art and artists from different movements and periods including pre- and post-1850.

Music technology AS and A level content is focused on the knowledge and skills which relate solely to music technology, with the content that overlapped with music A level removed. As a consequence the qualification now includes more technical, scientific and mathematical content.

Philosophy AS and A level content will enable students to gain a thorough grounding in key philosophical questions and concepts, including through critically engaging with ideas and reading and understanding the work of key philosophers and thinkers.

Psychology GCSE content will require all students to study in more breadth and depth the five core areas of psychology (social, cognitive, biological, developmental and individual differences), including key theories. All students will also be required to develop a strong understanding of research methods including quantitative analysis.

Sociology GCSE content has been updated to reflect the new, more demanding A level, with additional sections on the sociological approach and with students now required to know and understand the ideas of key sociological theorists.

As with the reform of the GCSE, the Department has developed subject content for design and technology A level. The A level retains a specialist focus with students able to study engineering, product design, or fashion design and development. All students will be required to study the core content of design processes that are at the core of contemporary design practice, and the technical principles needed to choose the right solution to address the design need.

16 Jul 2015 | Written statements | House of Commons | HCWS112

[Design and Technology GCSE](#)

Nick Gibb (Minister of State for Schools)

We are reforming GCSEs to make sure that they give students the best possible preparation for further and higher education, and for employment. We want new GCSEs to set expectations which match those of the best education systems in the world, with rigorous assessment that provides a reliable measure of students' achievement. The reforms are extensive and represent a new qualification gold standard.

Today we are publishing design and technology GCSE content that will assess both breadth and depth of knowledge, without limiting students on the materials they can work with. Current design and technology GCSEs have a wide range of titles each of which is focused on separate

material areas (such as resistant materials, textiles or graphics). The new content will support a single qualification title, a change which subject experts felt is critical to the development of a qualification that requires students to have a broad knowledge of the design processes, materials, techniques and equipment that are core to the subject.

The content emphasises iterative processes of designing which all students should understand and be able to demonstrate. Subject experts have advised that such processes are at the core of contemporary practice. By teaching students this approach, the new qualification will prepare them for further study and careers in design, engineering, manufacturing and related areas.

The content also sets out, in detail, the mathematical and scientific content that students must know and use that relate closely to design and technology.

Together these changes aim to ensure that all students have the knowledge and skills to design and make products or prototypes, using the best material, equipment and techniques, to solve real world and relevant problems across a range of contexts.

01 Jul 2015 | Written statements | House of Commons | HCWS74

Debate

[Education: English Baccalaureate](#)

Feb 2016 | House of Lords Grand Committee | 768 cc54-71GC

5. Further reading

Department for Education, [Reformed design and technology GCSE subject content](#) Government consultation response, November 2015

Campaign for Science and Engineering Science, [Policy Briefing Science and Engineering Education and Skills](#), October 2014

CBI, [Engineering our future: Stepping up the urgency on STEM](#), March 2014

Parliamentary Office of Science and Technology, [STEM education for 14-19 year olds](#), Number 430 March 2013

House of Lords Select Committee on Science and Technology, [Higher Education in Science, Technology, Engineering and Mathematics \(STEM\) subjects](#), 24 July 2012, HL Paper 37

Library briefing papers

[Teachers: supply, retention and workload](#), 12 February 2016, CBP-7222

[University Technical Colleges](#), 15 Jan 2016, CBP-7250

[GCSE, AS and A Level reform](#), 5 January 2016, SN06962

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