



a campaign to promote
women in science, technology
and engineering

Women in Science, Technology, Engineering and Mathematics: The Talent Pipeline from Classroom to Boardroom

UK Statistics 2014



Produced by WISE
July 2015

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WISE works from classroom to boardroom to attract, retain and develop female talent in science, technology, engineering and mathematics careers.

Our mission is to get one million more women active in the STEM workforce, boosting the talent pool and driving performance and growth for employers and the UK economy.

Amongst our wide range of outreach, promotional and advisory activities, we currently have two key campaigns in which you can get involved to help make a difference within the sector.



The **Ten Steps** is a corporate focused programme which provides a simple but effective framework that organisations can use to drive the necessary cultural and workplace changes that will support the attraction and retention of more women in STEM. The programme, co-founded by WISE and The Royal Academy of Engineering, has over 30 participating blue chip companies and welcomes others to find out more and get involved with this widely respected initiative.

People Like Me is our research led campaign that aims to change the way we talk about STEM careers and thus engage with a wider and more diverse audience, encouraging them to explore and engage in a science based education and career. People Like Me can change the ways girls experience careers advice, grow awareness and boost interest in a range of STEM careers. By becoming involved organisations can support our mission, influence their own outreach activities and work with like minded organisations to make a real impact on how we talk about, and to, the scientists, engineers and technologists of the future.

Log on to www.wisecampaign.org.uk for more information about getting involved with WISE in 2015.

Introduction

The publication of the WISE Statistics for female participation in Science, Technology, Engineering and Maths is always an important time for reflection.

We aim to continue to tell the statistical story from classroom to boardroom and to provide evidence of progress, important milestones and areas of concern. The good news is that more women are studying STEM subjects. However, it remains clear that progress is slow and that the challenge to attract, retain and promote female talent is as multi-layered and complex as ever.

That said, the statistics emphatically show that quality of female scientists and engineers is not the issue. At both ends of the journey – girls outperform boys at GCSE and A Level, growing numbers of excellent women go on to postgraduate study and high calibre candidates for board positions have been appointed at all FTSE 100 companies.

Hence, it would seem evident that it is the STEM sector and its employers that needs to change to attract and retain this rich and under exploited potential. Positive change will encourage more girls to study STEM subjects and help them remain enthused and engaged to pursue fulfilling careers that benefit both themselves, their employers and the economy.

However, as our 2014 Statistics Report illustrates, unless we create a different experience in schools for girls and a more attractive workplace culture we will not get the step change we desire in the number of women studying engineering and technology or reduce the numbers of women leaving companies mid-career. Encouragingly, more and more organisations are embracing this realisation. The business case for diversity and the ever present skills shortage are acknowledged realities. The race is on to attract more girls and women into the talent pool.

Helen Wollaston



Helen Wollaston
Director, WISE

Summary: Secondary Education



GCSE

facts

- Approaching equal percentages of girls and boys were entered for Science (Additional), Science, Mathematics, Biology, Statistics, Physics and Chemistry GCSEs in 2014.
- Girls achieved higher or equal A*- C GCSE combined grades compared to boys in all STEM subjects in 2012, except Mathematics (1 percentage point difference) and Other Science.

trend

- The rising trend for girls entered for GCSE Physics and Chemistry over the period of 2009-2012 has now plateaued between 2012 and 2014 with only modest increases in 2013 and 2014.

'A' Level

facts

- The overall proportion of girls doing STEM subjects drops off at 'A' level, with lower numbers of females compared to males being entered for all STEM subjects, except Biology.
- Chemistry 'A' level is more evenly balanced, with 48% female entries in 2014.
- A higher proportion of females achieved higher A*- C combined grades compared to males in all STEM subjects at 'A' level in 2014.

trends

- The upward trend in growth of female entrants for Biology and Chemistry continues with 59% and 48% respectively being girls.
- Only 21% of Physics 'A' level entrants were female, a figure that has remained static over recent years but the number participating rose in 2014 to 7,742.
- Almost four in ten (39%; 34,374) of Mathematics 'A' level entries were female in 2014, a minor increase (0.2%) since 2012 compared with a 6% rise in the number of boys participating over the same period.

Summary: Further & Higher Education



Apprenticeships

facts

- Females completed 20.7% (1,620) of ICT, 2% (130) of Construction, Planning & the Built Environment and 5.8% (1,460) of Engineering and Manufacturing apprenticeships in 2013/2014.
- The top six STEM types of apprenticeships completed by numbers of females in 2013/2014 were: IT User (1,130), Industrial Applications (950), IT and Telecoms Professionals including ICT (490), Engineering (230), Aviation (470) and Construction (130).

trends

- The number of females completing the majority of STEM apprenticeships remains static or is diminishing. The one exception is the growth in females completing Industrial Applications apprenticeships.
- But overall, due to the impact of the Industrial Applications apprenticeship, total STEM apprenticeships increased by 7% for females compared to only 1% for males - this represents 9% of current completions overall.

Vocational Qualifications

facts

- The most popular STEM QCFs with women were IT & Communications Technology where 126,000 women represented 40% of the cohort and Maths and Science in which the 80,000 male and 77,100 female candidates approached parity at 51% and 49% respectively.
- The largest gender gap is evident in Construction, Planning & the Built Environment where 2.6% females gained QCFs in 2013.

trend

- The number of females attaining STEM vocational qualifications and the percentage of the cohort they represent have increased dramatically from 14,600 and 8% in 2010/11 to 237,100 and 24% in 2012/13.

Degrees

facts

- At degree level, there are marked differences in the STEM undergraduate subjects which attract males and females:
 - Males dominated undergraduate degrees achieved in Engineering & Technology (86%), Computer Science (83%) and Architecture, Building & Planning (70%) in 2014.
 - Females dominated undergraduate degrees achieved in Subjects Allied to Medicine (82%), Veterinary Science (78%) and Agriculture & Related Subjects (64%) in 2014.
- In most subjects, the gender segregation is less marked at postgraduate level. In Engineering & Technology, for example, 23% of postgraduate degrees were obtained by women, compared to 14% at undergraduate level in 2014.

trend

- The number of females obtaining all Engineering and Technology degrees (8,755) has increased by 5% since 2011. The number of males has increased by only 1% in the same period.

Summary: Employment



Employment

facts

- 13% of all those working in occupations classed as STEM (including health occupations) are women (689,000).
- Females account for around two-thirds of Associate Health Professionals (65%; 99,000) and just over half of all health professionals (54%; 286,000).
- four in ten (42%; 65,140) Science Professionals are female and around three in ten Research and Development Managers (28.5%; 10,000).
- 22% (57,000) of Science and Engineering Technicians, 14% (124,500) of ICT professionals and 5.7% of Engineering professionals (26,000) are female.
- The occupations with fewest women are the Skilled Trades where 0.2% were female (4,400).

trends

- The number of female Science and Engineering Technicians (57,000) has declined by 10% since 2012.
- The number of female Engineering Professionals (26,000) has grown by 10.4% although women still only make up 5.7% of the profession.
- Despite the fact that female ICT professionals have grown by 3.5% to 124,500, employment growth in this area has been taken up more by men than women.

Participation of Women in the STEM Industries

- The STEM industries employing the lowest proportion of women are Construction (12%) and Mining and Quarrying (14%).

STEM Managers

- Only one in ten (10.2%; 58,400) of STEM managers are female.

STEM Business Owners

- Around one in ten (9 %; 7,000) of STEM business owners are women - a decline from the 2012 figure of 9,700, compared to 1 in 3 (36%; 238,000) who are owners of non-STEM businesses.
- Overall, women are less likely to be self-employed than men (10.2% of women are self-employed compared to 19.1% of men).

Women on Boards of Top Companies

- Two STEM companies are in the top 10 ranked FTSE 100 companies with the highest percentages of women on their Boards in 2015.
- All companies in the FTSE 100 now have at least one woman on the board.

The Statistics

UK Statistics 2014 presents an overview of female participation in Science, Technology, Engineering and Mathematics (STEM) in the UK by compiling the latest statistical data and presenting it in context of the female talent pipeline from classroom to boardroom.

We include data from secondary and higher education, vocational qualifications, workforce, industry, business ownership and women on boards of FTSE 100 companies. In 2012, WISE published its previous report, UK Statistics 2012. We have endeavoured to make this report a companion to its predecessor with consistent categories and data to allow for easy comparison. Where possible, this report has used the same methodologies and sources to produce this up to date version of key statistics for women in STEM. We have also included some additional insight and comment to add to the statistical narrative.

Data relates to the United Kingdom (UK) where available, or otherwise specified.

Secondary Education GCSE

The Joint Council for Qualifications provides data on GCSEs. **Figure 1** shows the percentages of girls and boys who were entered for STEM GCSEs in the UK in 2014. Almost equal percentages of girls and boys were entered for Science (Additional), Science, Mathematics, Further Mathematics, Biology, Statistics, Physics and Chemistry. The pattern alters for ICT, Design and Technology and Other Sciences¹ where fewer girls were entered for those subjects by 7, 9 and 10 percentage points respectively.

trend

- **The rising trend for girls entered for GCSE Physics and Chemistry over the period of 2009-2012 has now plateaued between 2012 and 2014 with only modest increases in 2013 and 2014. This saw 49% of Physics entrants and Chemistry entrants being girls. This is for the most part governed by curriculum restrictions which make science compulsory at GCSE and decisions taken by schools with regard to options to study double or triple science.**

Notes:

1. Other Sciences includes All Sciences except: Additional Science, Biology, Chemistry, Physics and Science.
2. Provisional data is presented. Final data will be available in 2015 and may change very slightly.
3. Other Technology includes Technology based subjects other than Design and Technology.

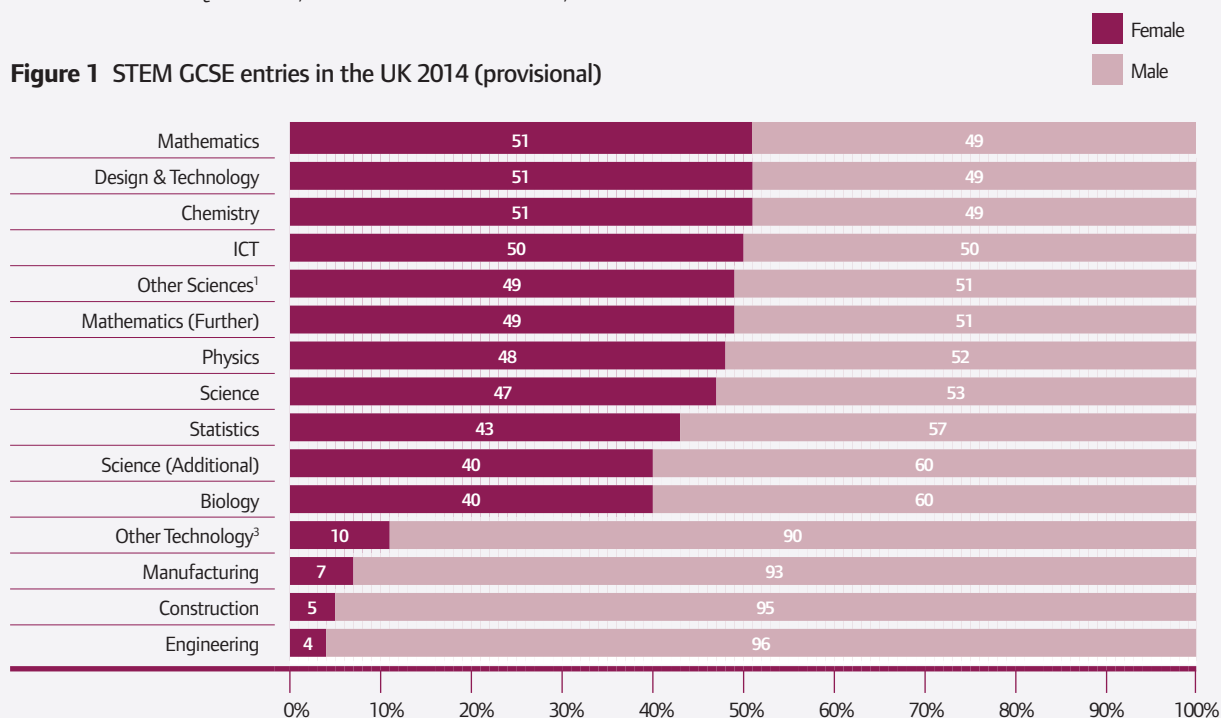
Table 1 Number of females and males entered for STEM GCSEs UK 2012 and 2014 (provisional)²

GCSE	Girls 2012	Boys 2012	Girls 2014	Boys 2014
Chemistry	74,754	84,372	67,930	70,308
Design & Technology	104,340	136,364	86,129	127,500
Mathematics	339,536	336,253	373,235	363,168
ICT	23,590	29,607	41,465	55,346
Mathematics (Further)	1,562	1,874	1,677	1,818
Other Sciences ¹	3,786	5,617	4,133	6,284
Physics	73,401	83,976	67,294	69,933
Science	281,757	270,747	190,247	184,714
Statistics	24,311	26,309	28,957	32,685
Biology	79,521	86,647	70,912	70,988
Science (Additional)	148,282	141,668	166,053	157,891
Other Technology ³	111	1,336	60	1,058
Manufacturing	9	174	31	277
Construction	18	653	24	559
Engineering	130	1,998	354	4,673

Source: Joint Council for Qualifications, Provisional full course GCSE results, June 2012 and 2014.

Total numbers studying ICT have grown by 30% and 39% respectively over 2013 and 2014 with girls making up 43% of total entrants. Design and Technology on the other hand has lost ground with figures down 9% and 3% over the last two years and the percentage of girls dropping from 43% to 40% of the entrants.

New GCSE qualifications in Manufacturing, Construction and Engineering are growing slowly but only represent a total of 5,550 entrants in 2014 and have not yet captured the imagination of girls who represent only 400 of those.

Figure 1 STEM GCSE entries in the UK 2014 (provisional)

Source: Joint Council for Qualifications, Provisional full course GCSE results, June 2014. Decimals were rounded up or down to the nearest whole number.

Figure 2 shows the percentages of girls and boys achieving A*-C grades in GCSE STEM subjects in 2014 (provisional). The figure reveals that girls achieved better or equal A*-C GCSE combined grades compared to boys in all STEM subjects except Mathematics (1%) difference and Other Science.

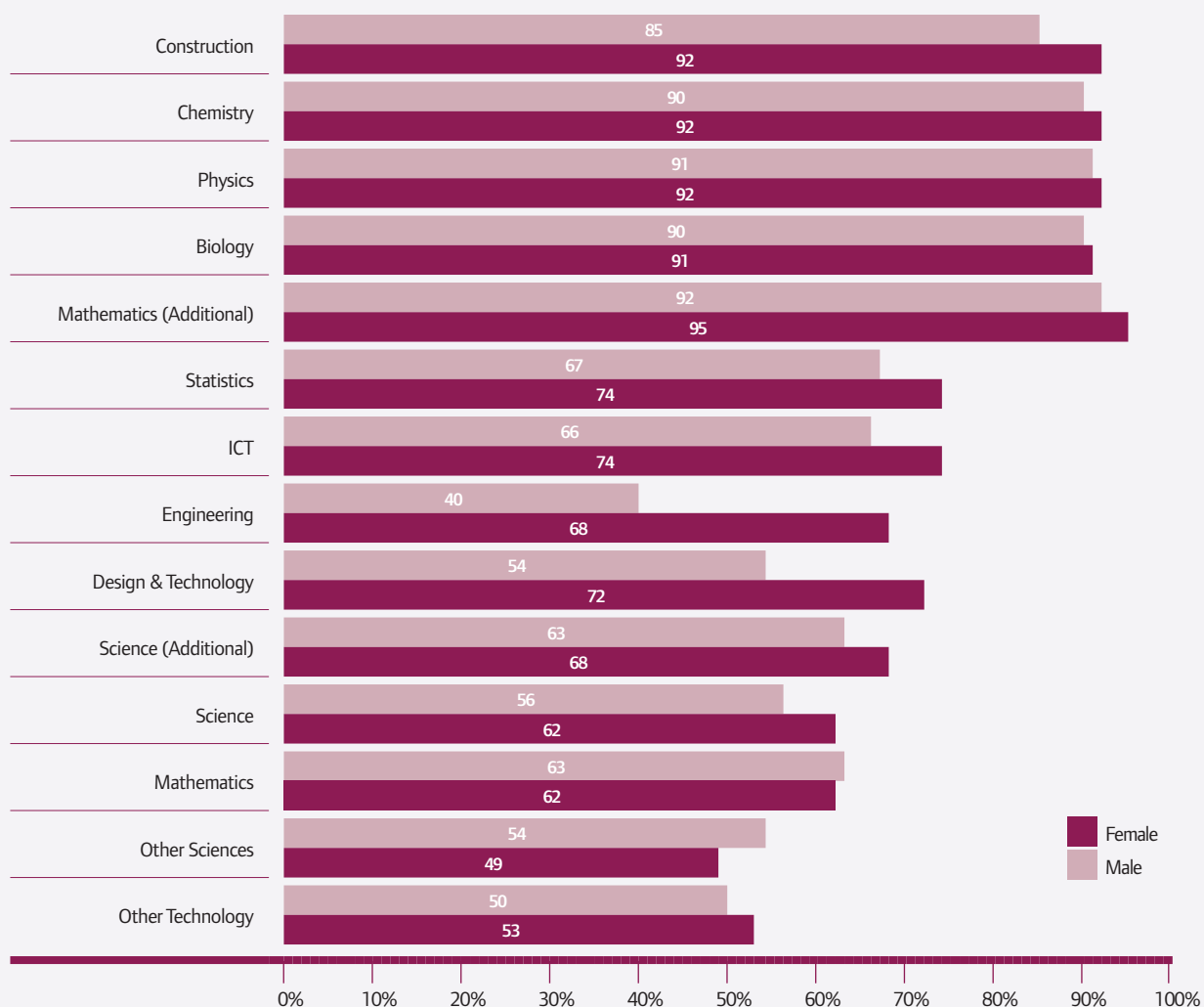
In Engineering and Design & Technology, there is a marked percentage point difference (28% and 18% respectively) between the A*-C grades achieved by boys and girls. Girls are outperforming boys significantly in these subjects, when they chose to study them.

further insight

- Research has shown that students don't make links between curriculum knowledge and their future careers and need to know that for some STEM careers triple science is either desirable or essential.

Source: Engineering UK 2015.

Figure 2 STEM GCSE A*-C grades in the UK 2014 (%) (provisional)



Source: Joint Council for Qualifications, Provisional full course GCSE results, June 2014. Decimals were rounded up or down to the nearest whole number.

Secondary Education 'A' Level

The Joint Council for Qualifications provides data on GCE 'A' levels. The STEM picture at 'A' level becomes more gender segregated compared to GCSE, with lower percentages of females compared to males being entered for all STEM subjects in 2014, except Biology. **Figure 3** shows the growth or decline in the percentage gender balance for the key STEM subjects.

The upward trend in growth of female entrants for Biology and Chemistry continues with 59% and 48% respectively being girls. This represents a 6% growth in girls studying Biology and 11% in Chemistry. Male entrants grew by 6% in Chemistry whilst declining by 4% in Biology over the same period. This seems set to continue to fuel strong female applicants for Medicine and its allied subjects and Natural Sciences at degree level.

Although 21% of Physics 'A' level entrants were female, figures have remained largely static with only 7,743 women studying 'A' level Physics in 2014. This is despite a better performance by girls at GCSE and better historical performance by previous cohorts at 'A' level.

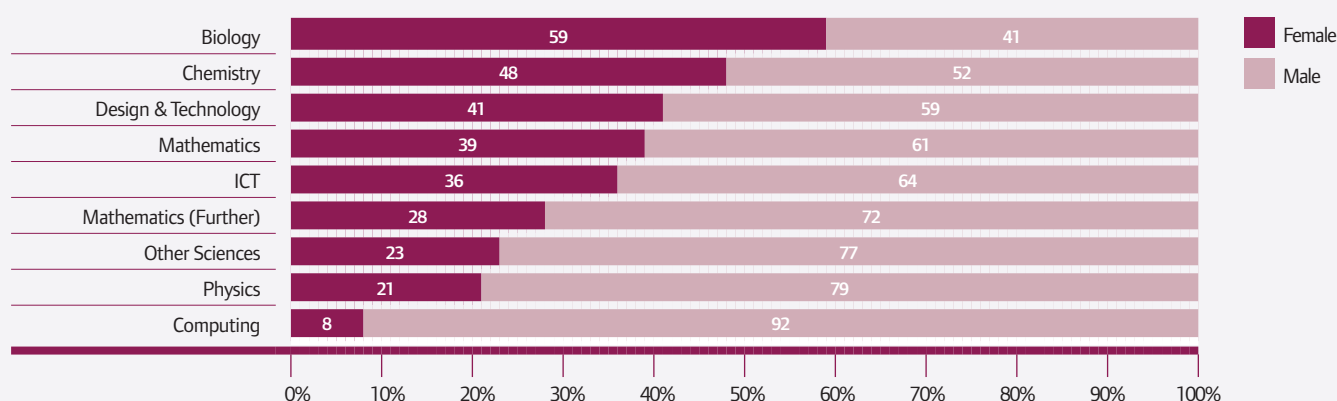
Almost four in ten (39%; 34,374) of Mathematics 'A' level entries were female in 2014, a minor increase (0.2%) since 2012, compared to a 6% rise in the number of boys participating over the same period.

Table 2 Number of females and males entered for STEM 'A' levels UK 2012 and 2014 (provisional)

'A' Level	Females 2012	Males 2012	Females 2014	Males 2014
Biology	35,664	27,410	37,724	26,346
Chemistry	23,260	25,974	25,876	27,637
Design & Technology	7,298	9,807	5,591	8,100
Mathematics	34,301	51,413	34,374	54,442
ICT	4,284	6,804	3,421	6,058
Mathematics (Further)	3,972	9,251	3,975	10,053
Other Sciences	762	2,613	795	2,691
Physics	7,361	27,148	7,743	28,958
Computing	297	3,512	341	3,857

Source: Joint Council for Qualifications, Provisional GCE 'A' Level Results, June 2012.

Figure 3 STEM 'A' level entries in the UK 2012 and 2014 (provisional)



Source: Joint Council for Qualifications, 2014. Decimals were rounded up or down to the nearest whole number.

Figure 4 shows the percentages of females and males achieving A*- C grades in 'A' level STEM subjects in 2014 (provisional). The figure reveals that females achieved higher A*- C combined grades compared to males in all STEM subjects at 'A' level in 2014. Females (67%) outperformed males (57%) by ten percentage points in ICT at 'A' level and nine percentage points in Design & Technology. This mirrors similar patterns at GCSE and indicates the strong capability of the young women who chose to study these subjects.

This pattern is repeated in non-STEM subjects. Females outperformed males in all A*- C combined grades at 'A' level in 2014, except in French, German and Spanish.

further insight

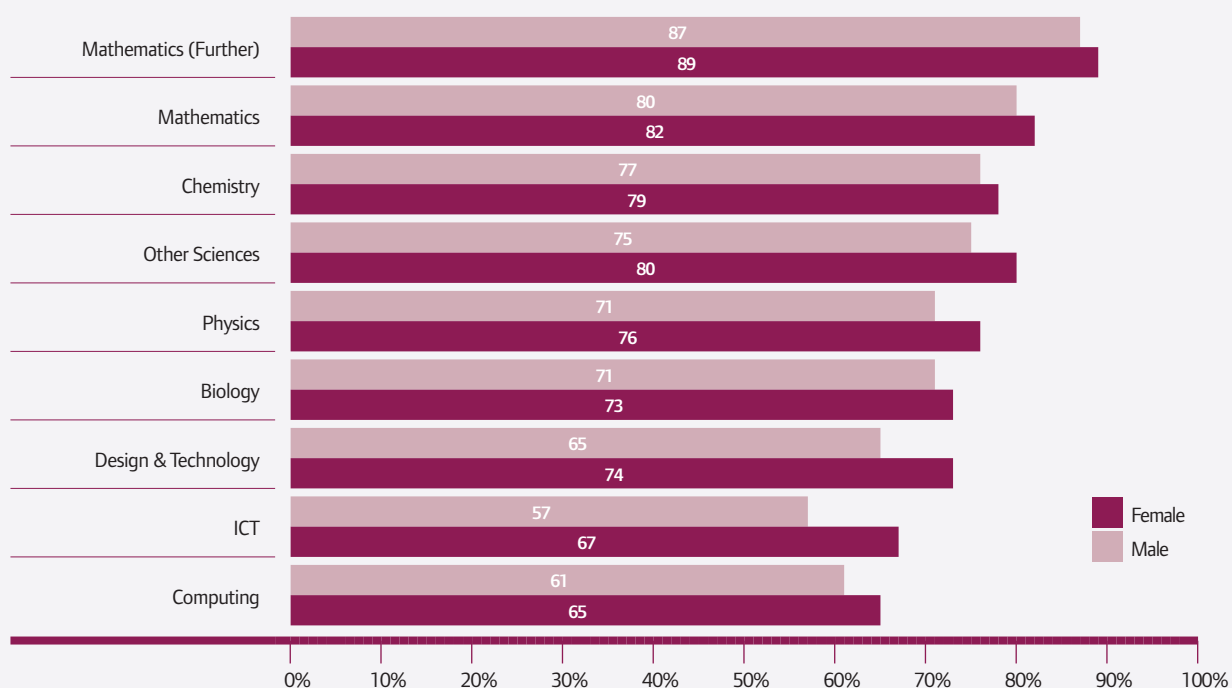
- Students in the private education sector were more likely to study Maths (46% vs 28%) and Physics (18% vs 11%) 'A' level.

In 2014 female students had a higher A*- C pass rate than male students in Maths (81.6% vs 79.8%) and Physics (76.4% vs 71.1%).

At almost half (49%) of state funded, co-ed schools, no girls at all do 'A' level Physics. However, a girl is four times more likely to take Physics 'A' level if she attends a single sex, independent school than a mixed state school.

Source: McDonald, A. (2014) *Not for people like me?* Under-represented groups in science, technology and engineering. WISE.

Figure 4 STEM 'A' level A*- C grades in the UK 2014 (provisional)



Source: Joint Council for Qualifications, 2014. Decimals were rounded up or down to the nearest whole number.

Further & Higher Education Apprenticeships

The Data Service provides data on apprenticeships. This section analyses apprenticeship data from 2013/14. The commentary is about **all** apprenticeships completed by combining intermediate, advanced and higher apprenticeships. The data presented is for three frameworks: Engineering Manufacturing Technologies, Construction Planning & the Built Environment and Information & Communication Technology.

Females completed 20.7% (1,620) of ICT, 2% (130) of Construction, Planning and the Built Environment and 5.8% (1,460) of Engineering and Manufacturing apprenticeships in 2013/2014.

See **Figure 5**.

The top six STEM types of apprenticeships completed by numbers of females in 2013/14 (see **Table 3**) were: IT User (1,130), Industrial Applications (950), IT and Telecoms Professionals including ICT (490), Engineering (230), Aviation (470) and Construction (130).

Table 3 Female completions of STEM apprenticeships, 2010/2011 and 2013/14

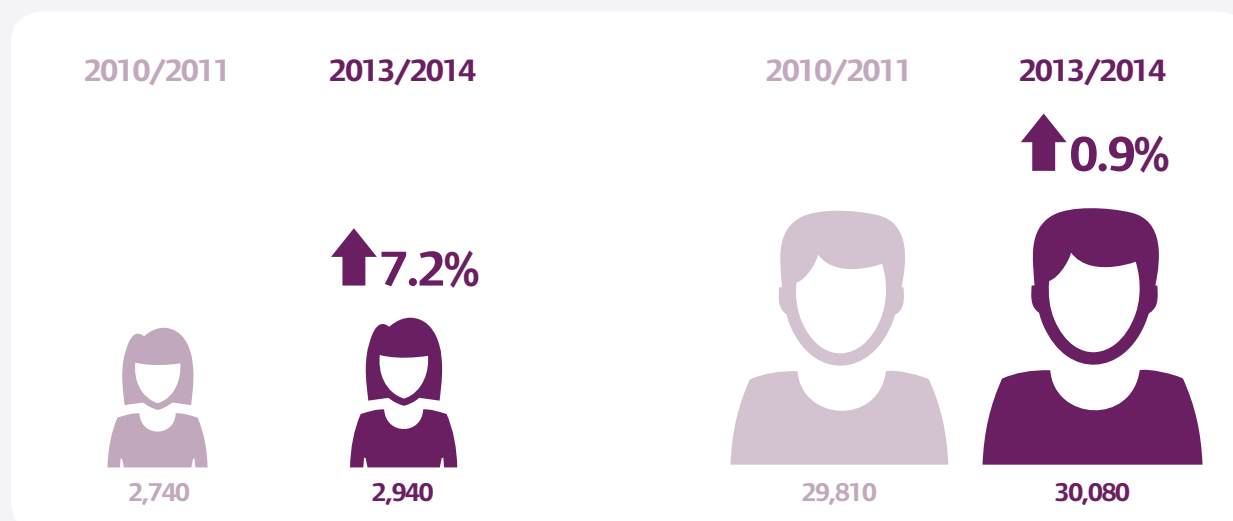
Apprenticeship	Females Completions 2010/2011	Males Completions 2010/2011	Females Completions 2013/2014	Males Completions 2013/2014
IT User	1,100 (36.6%)	1,930 (63.4%)	1,130 (38.8%)	1,780 (61.2%)
IT and Telecoms Professionals inc. ICT	790 (10.6%)	6,610 (89.4%)	490 (9.9%)	4,440 (90.1%)
Engineering	430 (3.81%)	10,830 (96.19%)	230 (3.1%)	7,410 (96.9%)
Aviation	220 (32.8%)	450 (67.2%)	150 (24.2%)	470 (75.8%)
Construction	130 (1.4%)	9,120 (98.6%)	130 (1.7%)	7,610 (98.3%)
Industrial Applications	70 (7.5%)	870 (92.5%)	950 (10.2%)	8,370 (89.8%)
Total	2,740 (8.4%)	29,810 (91.6%)	2,940 (8.9%)	30,080 (91.1%)

Source: The Data Service, Apprenticeship Framework Achievements by Sector Framework Code, Level and Gender (2013/14). Numbers were rounded to the nearest ten.

One growth area has been the Industrial Applications Apprenticeship that has increased dramatically from only 70 female applicants in 2010/11 to 950 in 2013/14. This represents a growth year on year of an average of 250%. Completion of other STEM apprenticeships remains static or diminishing with regard to female participation. Of the top six, IT User

apprenticeships were the least gender segregated, with 38.8% of females completing, followed by Aviation, with 24.3% of females completing.

Figure 5 Apprenticeships in STEM subjects completed by females and males in 2013/14 compared with 2010/11



Source: The Data Service, Apprenticeship Framework Achievements by Sector Framework Code, Level and Gender (2010/11) and (2013/14). Where numbers dropped below five they were not included. Numbers were rounded to the nearest ten.

Further & Higher Education Vocational Qualifications

The Data Service provides data on NVQs, SVQs and QCFs achieved. Since the publication of our previous report in 2012 the number of NVQ/SVQ awards has decreased by 94%. The reduction in the number of NVQs is directly attributable to the introduction of the QCF (Qualification Credit Framework) in 2009 as all newly regulated qualifications are now approved by Ofqual as QCFs. **Figure 6** illustrates the growth in QCFs and phasing out of NVQs.

For this current report, statistics are presented based on the most recent QCF data (2012/2013). Four categories of QCF are relevant as STEM qualifications and these are shown in **Table 4**.

This analysis combines **all** levels of QCFs. Since our previous report both the number of females attaining STEM vocational qualifications (as QCFs and small numbers of NVQs) and the percentage of the cohort they represent has increased dramatically from 14,600 (ref. WISE 2012) and 8% in 2010/11 to 237,100 and 24% in 2012/13.

Table 4 STEM QCF qualifications in 2012/13

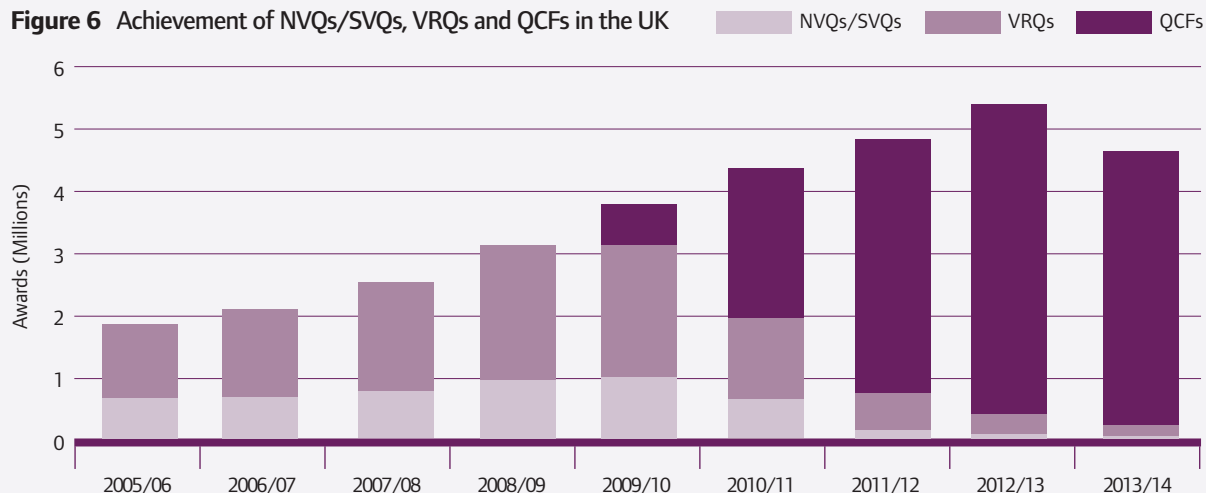
QCF	Awarded to Males 2012/13	Awarded to Females 2012/13	Total
Science & Maths	80,000 (51%)	77,100 (49%)	157,100
Engineering & Manufacturing	261,000 (90.3%)	28,200 (9.7%)	289,200
Construction	219,300 (97.4%)	5,800 (2.6%)	225,100
IT & Telecoms	184,500 (60%)	126,000 (40%)	310,500

Source: The Data Service 2012/13, Achievement of QCFs by Sector Subject Area, by Level of Achievement and Gender

The most popular STEM QCFs with women were IT & Communications Technology where 126,000 women represented 40% of the cohort, and Maths and Science in which the 80,000 male and 77,100 female candidates approached parity at 51% and 49% respectively.

The largest gender gap is evident in Construction, Planning and the Built Environment where 2.6% females gained QCFs in 2013 - see **Figure 7**.

Figure 6 Achievement of NVQs/SVQs, VRQs and QCFs in the UK



Source: Vocational Qualifications Database/OfQual.

Note: Figures do not cover all VRQ and QCF achievements in the UK and should be treated with care.

Further & Higher Education Degrees

Figure 7 QCFs gained by STEM subject area and gender 2012/2013

Science & Maths QCFs – 2012/13



49%



51%

Information Technology & Telecoms QCFs – 2012/13



40%



60%

Construction, Planning & the Built Environment QCFs – 2012/13



2.6%



97.3%

The Higher Education Statistics Agency (HESA) provides data on the numbers of undergraduates and postgraduates obtaining degrees in STEM subjects. This analysis presents data on all undergraduate and all postgraduate males and females obtaining degrees in 2014 in STEM related categories defined by HESA.

Figure 8 (overleaf) shows the percentages of females and males who obtained undergraduate degrees in STEM related subjects. The clear pattern in **Figure 8** is a visual indicator of female and male dominated subject areas, or areas where there is a greater gender balance in STEM subjects.

In Engineering and Technology (86%), Computer Science (83%) and Architecture, Building & Planning (70%), males dominated undergraduate degrees in 2014.

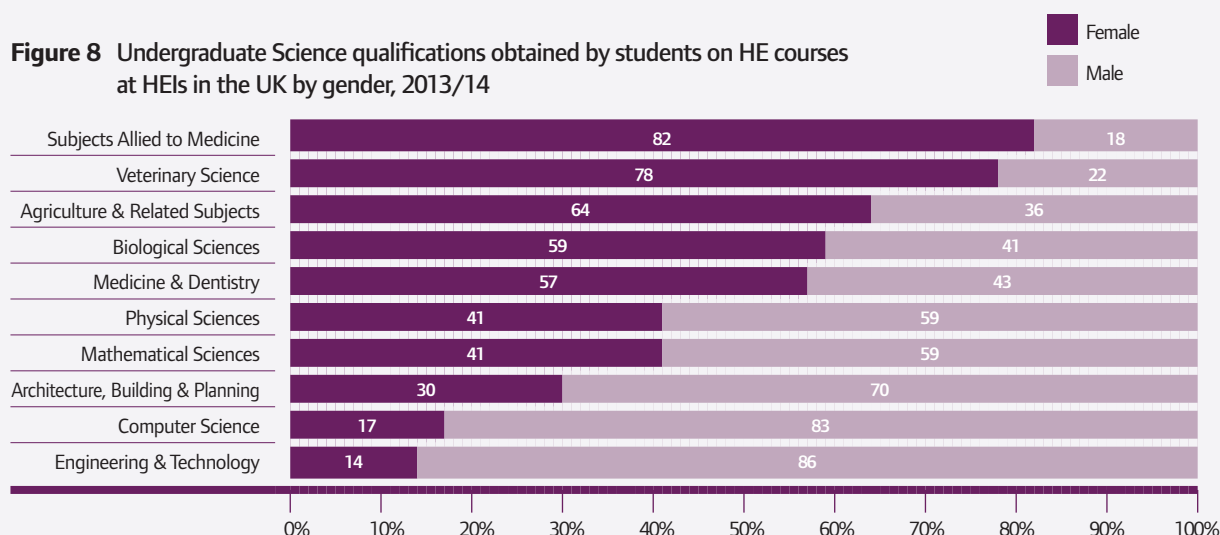
In Subjects Allied to Medicine (82%), Veterinary Science (78%) and Agriculture & Related Subjects (64%), females dominated undergraduate degrees in 2014.

In other STEM related subjects, the gender imbalance was less marked; for example 41% of females and 59% of males obtained degrees in the Physical Sciences and 42% of Mathematical Sciences graduate were female.

In 2014, 4,395 undergraduate and 4,310 postgraduate females obtained Engineering & Technology degrees, a total of 8,705. An increase of 4.7% since our previous report.

Source: The Data Service 2012/13, Achievement of QCFs by Sector Subject Area, by Level of Achievement and Gender. Numbers were rounded to the nearest 100. Decimals were rounded up or down to the nearest whole number.

Figure 8 Undergraduate Science qualifications obtained by students on HE courses at HEIs in the UK by gender, 2013/14



Source: HESA, 2013/14. Qualifications obtained by students on HE courses at HEIs in the UK. Decimals were rounded up or down to the nearest whole number.

further insight

A total of 11,505 (8,070 undergraduate and 3,435 postgraduate) females obtained degrees in the Physical Sciences. A 6% increase since our previous report. Whilst 5,005 (3,945 undergraduate and 1,060 postgraduate) females obtained degrees in Mathematical Sciences, showing a strong increase of 12%. By comparison, male graduates in Mathematical Science have increased by 14% over the same period.

Figure 9 shows the percentages of females and males who obtained postgraduate degrees in STEM related subjects. The bar chart in **Figure 9** is a visual indicator of female and male dominated subject areas, or areas where there is a greater gender balance in STEM subjects.

• Analysis of degree non-continuation rates has highlighted an additional issue that further limits an already small supply. The non-continuation rate average for all subjects is 14.2%.

Three key STEM subjects have above average non-continuation rates: Computer Science (18.1%), Engineering & Technology (15.6%) and Mathematical Sciences (14.6%).

Source: Engineering UK 2015.

In most postgraduate subjects, gender diversity increases when compared to undergraduate subjects, emphasising the quality of female graduates. In Engineering & Technology, for example, females obtained 24% of postgraduate degrees, compared to only 14% at undergraduate level. Whilst Architecture, Building & Planning has 42% female postgraduates compared to 32% at undergraduate level. The gap is also closing in Computer Science where women represent 25% at postgraduate level compared to 16% at undergraduate level.

Of the STEM subjects less popular with women only Mathematical Sciences shows the opposite trend with a smaller percentage of females (38%) at postgraduate level compared to undergraduate level (42%).

The number of females obtaining all Engineering and Technology degrees (8,705) has increased by 4% since our

last report. By comparison, the number of male graduates (41,475) has increased by 0.5% over the same period, 2010/11 to 2013/14.

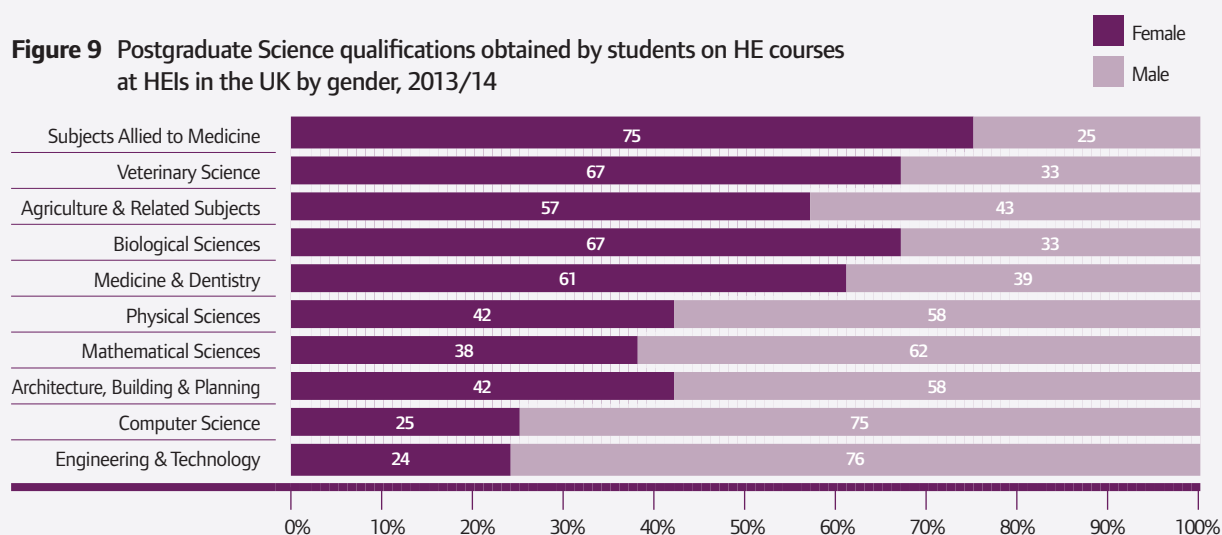
The total number of women graduating in STEM subjects stands at 157,865 compared to 150,590 men taking STEM degrees at undergraduate and postgraduate level. This being said the recently released UCAS acceptance data makes sobering reading with little progress or growth in 2014 in female applications to study subjects in which they are still under-represented. Whilst women continue to dominate in Veterinary, Medical, Biological and Allied Sciences, they represent only 23% of the acceptances in Physics, Mathematics, Computing and Engineering – a figure that has remained stubbornly unchanged since 2007.

further insight

- 71% of male engineering graduates who were in employment went into an engineering occupation, compared with 58.7% of female graduates.

Source: Engineering UK 2015.

Figure 9 Postgraduate Science qualifications obtained by students on HE courses at HEIs in the UK by gender, 2013/14



Source: HESA, 2013/14. Decimals were rounded up or down to the nearest whole number.

Employment Industry

The secondary analysis of employment begins with a focus upon industries using the Labour Force Survey (LFS) April to June 2014⁴. It uses the UK Standard Industrial Classification 2007 (UK SIC 2007) and presents data on major groups⁵. Industries are classified as STEM or non-STEM for the purposes of the analysis.

Figure 10 is a profile of females and males in STEM industries. The industry profile tells us nothing about the types of occupations that women and men are in. Occupations are explored in the next section. The industry profile simply tells us about the numbers of females and males in a whole range of jobs ranging including administration and professional roles.

The most gender-segregated industries in this analysis are Construction which is 12% female (268,000⁶) and 88% male (1.9 million) and Mining and Quarrying which is 14% female (11,650) and 86% male (102,000).

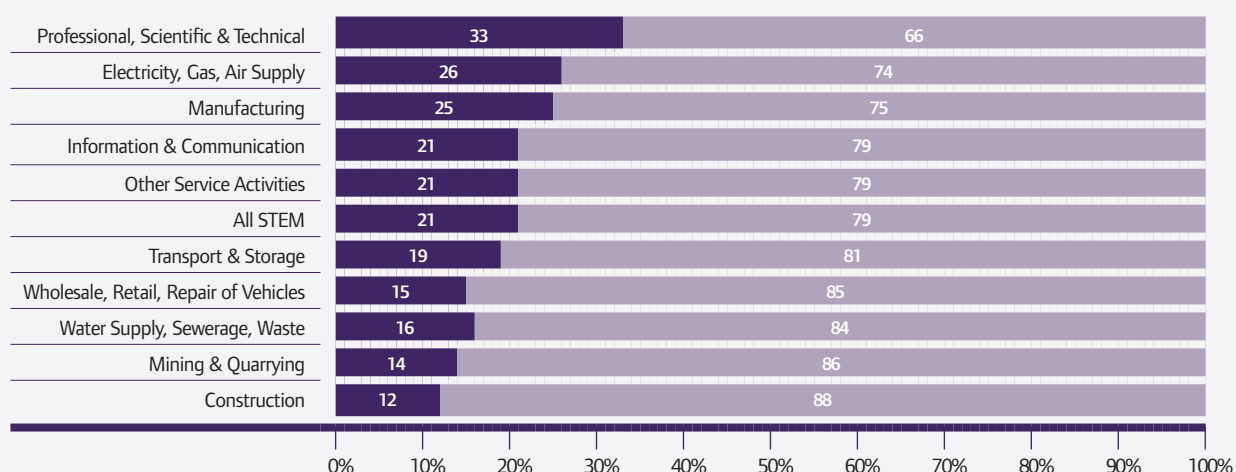
There has been little change in the makeup of the workforce in the STEM sector since our previous report. However, against a total sector growth of 3.5%, there has been a 7.1% increase in female occupation across the relevant groups.

further insight

- It is estimated that a total of 100,000 female STEM graduates are unemployed or economically inactive in the UK.

Source: WISE 2012.

Figure 10 Percentage of females and males in UK STEM Major Group Industries 2014



Source: Labour Force Survey, April – June 2014. Males aged 16-64 and females aged 16-59. Decimals were rounded up or down to the nearest whole number.

Notes:

4. If separated out the numbers become very small for females in some areas.
5. The Office for National Statistics, Social Survey Division and Northern Ireland Statistics and Research Agency, and the UK Data Archive bear no responsibility for the further analysis or interpretation of the LFS data. Crown copyright material is reproduced with the permission of the Controller of HMSO and the Queen's Printer for Scotland.

6. See <http://www.ons.gov.uk/ons/guide-method/classifications/current-standard-classifications/standard-industrial-classification/index.html> for a comprehensive explanation of Industrial Classification for data purposes. The Major classification of industries is into 21 categories.

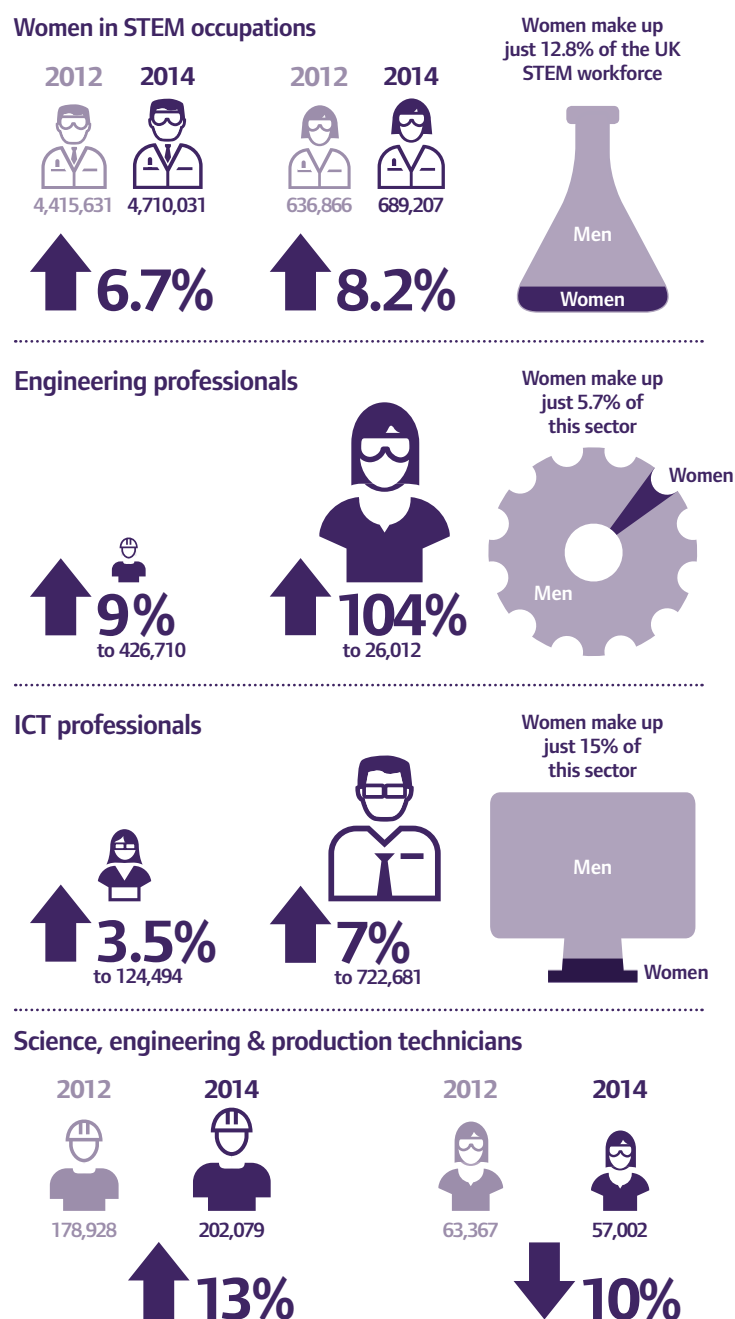
Employment Occupations

The secondary analysis of occupations within industries uses the UK Standard Occupational Classification 2010 (UK SOC, 2010) and presents data on major and minor groups⁷. Occupations have been classified as STEM or non-STEM for the purposes of the analysis.

Figure 11 starts to break down the occupational structure and shows the proportion of females and males in all STEM occupations (including health). **Figure 12** (overleaf) breaks down the occupational structure even further into minor group occupations.

13% of all those working in STEM occupations in the UK are women (690,000 - including health), compared to 4.7 million men. 52,000 women have joined the STEM sector since our previous report. Women are choosing STEM professions at a higher rate than men - however, the 52,000 increase represents only a rise from 12.6% to 12.8% of all STEM occupations.

Figure 11 STEM occupations by sector and gender in 2014



Note:

7. See <http://www.ons.gov.uk/ons/guide-method/classifications/current-standard-classifications/soc2010/index.html> for a comprehensive explanation of Occupational Classification for data purposes. This analysis presents the Major SOC Occupations in three groups. This analysis presents thirteen Minor SOC occupations.

Source: WISE analysis of Labour Force Survey, April - August 2014.



Figure 12 shows the proportions of females and males in minor occupational groupings classed as STEM. Decimals are not rounded in **Figure 12** as this would obscure the findings where the percentages are under 0.5 – for example the Skilled Construction and Building Trades (0.2 %).

The dominance of the Health Sector is clear from the pattern in **Figure 12**. Females account for around two-thirds of Associate Health Professionals (65%; 99,000) compared to males (35%; 53,000). Females (54.2%; 286,000) also outnumber males (45.8%; 241,000) as Health Professionals.

Four in ten (42%; 65,140) Science Professionals are females as are around three in ten Research and Development Managers (28%; 10,000). 22% (57,000) of Science and Engineering Technicians (a 10% decline since our previous study), 14% (124,500) of ICT professionals and

5% (26,000) of Engineering Professionals are female.

The decline in the number and proportion of female technicians is a worrying trend. An increased number of STEM apprenticeships are currently being taken up by males rather than females. If this becomes a more common route into science and engineering, there is a risk that this will cause overall female numbers in the STEM workforce to decline.

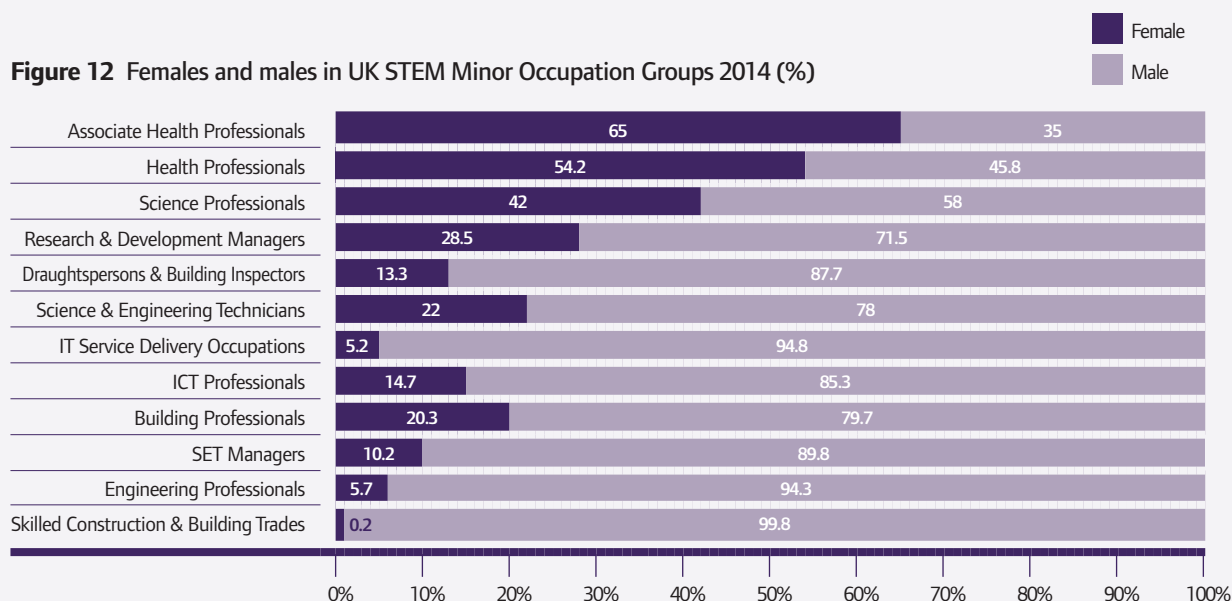
Despite the fact that female ICT professionals have grown by 3.5% to 124,500, employment growth in this area has been taken up more by men than women. Similarly, in IT Service Delivery the number of females has fallen by 16% whilst male employment has risen by 400%. The most extreme gender segregation is still in the combined Skilled Trades where only 0.2% (5,250) are female, a 52% decline from our previous survey.

further insight

- In the UK the proportion of female Engineering Professionals varies by ethnicity. Only 6% of white Engineering Professionals are female compared with 14% of those from BME backgrounds.

Source: Engineering UK 2015: The state of engineering.

Figure 12 Females and males in UK STEM Minor Occupation Groups 2014 (%)



Source: Labour Force Survey, April – June 2014. Males aged 16–64 and females aged 16–59. Decimals were NOT rounded up or down to the nearest whole number, as this would obscure the findings on Skilled Construction and Building Trades.

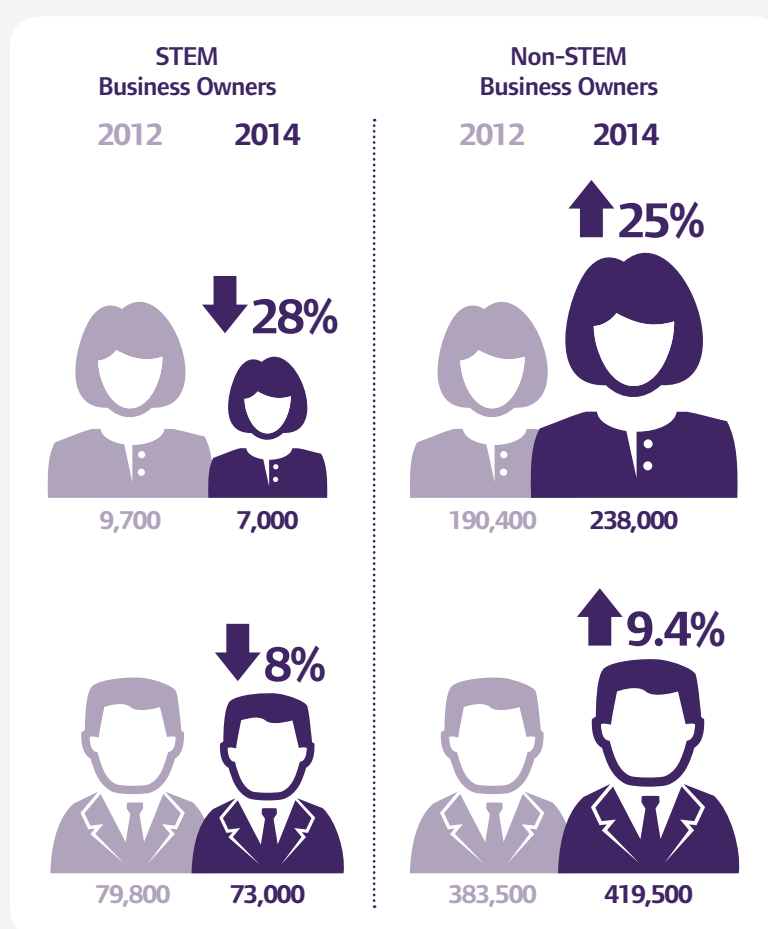
Employment Self-employment

The definition of STEM business owners used in this analysis is those who are self-employed and STEM Directors/Managers. This is a proxy definition derived from variables in the Labour Force Survey and as such caution must be advised in interpreting the statistics presented. This definition captures the comparison between females and males running traditional businesses in the areas of manufacturing, construction and technology.

Figures relating to professionals, perhaps working as individual consultants and sole traders show there has been growth in the number of self-employed female architects (an additional 5,000) and IT specialists (increasing from 6,000 to 12,000) since 2012.

Figure 13 shows the comparison between females and males who are STEM and non-STEM business owners. Around one in ten (9%; 7,000) of STEM business owners are women, a decline from the 2012 figure of 9,700, compared to one in three (36%; 238,000) who are owners of non-STEM businesses, an increasing number. Overall, women are less likely to be self-employed than men (10.2% of women are self-employed compared to 19.1% of men) and even less likely to be owners of a STEM business.

Figure 13 Self-employed females and males who are STEM managers (business owners) and non-STEM managers (business owners) in 2014, compared with 2012



Source: Labour Force Survey, April – June 2014 and April – June 2012. Males aged 16-64 and females aged 16-59.

Employment Women on Boards of FTSE 100 Companies

This section explores female representation on the Boards of the Financial Times Stock Exchange (FTSE) 100 companies in STEM and non-STEM sectors. The secondary analysis uses data from the Cranfield University School of Management Female FTSE 100 report 2012 (Dolder et al, 2015). The report ranks the FTSE 100 companies according to the percentages of women they have on their Boards. From this list, 51 companies are classified as STEM and 49 non-STEM.

At the time the Cranfield report was published, 23.5% of Board Directors of FTSE 100 companies were female (Dolder et al, 2015). 22% of the Board Directors of STEM FTSE 100 companies were female compared to 26% of non-STEM Board Directors.

All FTSE 100 companies now have at least one woman on the board. But closer analysis reveals important differences (see **Table 5**) in numbers of women on Boards at STEM and non-STEM companies, with 56% of non-STEM companies having more than two women directors, whilst only 39% of STEM companies have achieved that distinction. However, there are a total of 263 women on FTSE 100 boards of which 125 are at STEM companies; this represents 47% of female directors.

Of those companies achieving the voluntary 25% women on boards target urged in the Lord Davies report, 21 of the 41 are STEM companies. However, it is concerning that the number of executive directors remains low at only 24 in the total FTSE 100 (8.6%). For STEM companies this figure shrinks even further with only two female CEOs at Severn Trent and Imperial Tobacco and six female CFOs amongst the 51 STEM companies, representing just 5% of executive directors.

The Cranfield report (2015) ranks only two STEM companies in its top 10 with the highest percentages of women on their Boards – in joint first place, Diageo PLC (45.5%) and in eighth place, Unilever (35.7%).

= 1	Diageo PLC	45%
= 1	Intercontinental Hotels Group PLC	45%
3	Admiral Group PLC	42%
= 4	Capita PLC	40%
= 4	Kingfisher PLC	40%
6	Old Mutual PLC	38%
7	3i Group PLC	37%
8	Unilever PLC	35%

Table 5 FTSE 100 STEM and non-STEM companies with women on their Board

	STEM companies	Non-STEM companies
Number of companies	51	49
Companies with no women on their board	0	0
Companies with one woman on their board	8 (16%)	5 (10%)
Companies with more than two women on their board	20 (39%)	27 (55%)

Source: The Female FTSE 100 Board Report 2015. Cranfield University School of Management.

further insight

- Female executive directorships in the 25 manufacturing companies within the FTSE 100 have actually fallen from 7 in 2013 to 6 in 2014 and only 5 in 2015, underlining the fragility of female board representation in the STEM sector.

Source: Women in Manufacturing Report 2015 – EEF.

- There have been 192 appointments of women on FTSE 100 boards since the Davies Report in 2011. Fewer than 20 new female appointments are now needed to reach the 25% women on boards target by the end of 2015.

Source: Women on Boards: Davies Review Annual Report 2015

Endnotes

1. Other Sciences includes All Sciences except: Additional Science, Biology, Chemistry, Physics and Science.
2. Provisional data is presented. Final data will be available in 2015 and may change very slightly.
3. Other Technology includes Technology based subjects other than Design and Technology.
4. If separated out the numbers become very small for females in some areas.
5. The Office for National Statistics, Social Survey Division and Northern Ireland Statistics and Research Agency, and the UK Data Archive bear no responsibility for the further analysis or interpretation of the LFS data. Crown copyright material is reproduced with the permission of the Controller of HMSO and the Queen's Printer for Scotland.
6. See <http://www.ons.gov.uk/ons/guide-method/classifications/current-standard-classifications/standard-industrial-classification/index.html> for a comprehensive explanation of Industrial Classification for data purposes. The Major classification of industries is into 21 categories.
7. See <http://www.ons.gov.uk/ons/guide-method/classifications/current-standard-classifications/soc2010/index.html> for a comprehensive explanation of Occupational Classification for data purposes. This analysis presents the Major SOC Occupations in three groups. This analysis presents thirteen Minor SOC occupations.

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