Baseline Evidence and Research Project for Gender Equality in STEM

Final report: 2. Data review

Presented to **Welsh Government Office for Science** by **Arad Research**

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Contents

List of tables

List of figures

1. Introduction

The Welsh Government Office for Science commissioned Arad Research to undertake a Baseline Evidence and Research Project for Gender Equality in STEM. Three reports (and a separate infographic summary) were produced as part of the study's final outputs:

1. Literature review.
2. Data review (this report).
3. Stakeholders' views.

This report presents the findings of the data review. Its purpose is to provide an overview of the available data relating to gender equality in STEM. It presents descriptive analysis of the Wales-level data that is available by gender on:

- learners' participation and attainment in STEM-related education subject areas:
  - at different stages of compulsory school education (Section 2);
  - in different sectors of post-16 education (Section 3);
- the profile of the education workforce in STEM-related education subject areas (Section 4);
- employment, earnings, business and enterprise in STEM-related sectors and occupations.

1.1 Key findings

A summary of the key findings from this report are shown below in relation to each life-stage: *Compulsory education*; *Post-16 education*; *Education workforce* and *Employment and the labour market*.

Key findings: Learners in compulsory education

Primary

- Girls consistently out-perform boys in **STEM subject assessments** during the Foundation Phase (Maths only) and Key Stage 2 (Maths and Science).

Secondary

Key Stage 3

- Girls out-perform boys in Maths and Science. The gap between the percentage of girls and boys achieving the expected level (Level 5+) at **Key Stage 3** has increased over the past 20 years:
  - In Maths, girls outperform boys by 4.2 percentage points (2.5 in 1999).
  - In Science, girls outperform boys by 4.8 percentage points (1.9 in 1999).

GCSE entries

- **GCSE entries** in STEM academic subjects have increased among girls and boys. More girls than boys now enter GCSE **Biology**, **Physics** and **Chemistry**;

GCSE Attainment

- A higher percentage of girls than boys achieve a **GCSE A/A*** or an **A*-C grade** in most STEM subjects.
  - However, in 2018/19 the percentage of boys achieving **A*** in **Physics** GCSE was 5.7% higher than girls.
  - Far fewer girls than boys enter **GCSE in ICT and DT**, despite a higher percentage of girls achieving A*-C grades.
  - The number of girls entering **GCSE ICT** has halved in last 10 years. The number of boys entering ICT has remained static.

Career Aspirations

- Higher percentages of Year 10 females aspire to some STEM-related career areas notably **Health and Medical** and **Animal Care.**
- A higher percentage of males tend to aspire to some STEM-related career areas notably **Engineering**, **Computers**, **Software and IT** and **Building and Construction**.

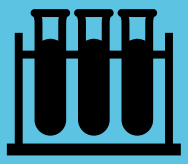
Key findings: Post-16 education

A Levels

- At **A level**, a higher percentage of girls than boys achieve an **A/A*** or an **A*-C grade** in most STEM subjects.
- Far fewer girls than boys enter **A levels in ICT and DT**, despite a higher percentage of girls achieving A*-C grades.
  - A higher percentage of girls than boys achieved A*-C grades across all A level subjects except Mathematics in 18/19.
  - But fewer girls than boys enter **Maths**, **Physics**, **ICT** and **DT** A Levels.
- The number of girls entering **ICT** and **DT A levels** are falling faster than boys.

Further Education, Work-based and Adult Learning

- In **FE,** there has been a larger decline in STEM learning activities among females than males in recent years.
  - Female enrolments comprise just under a third of FE STEM courses (32.4% in 2017/18).
- Wales is the only UK nation where over half of enrolments on **STEM apprenticeships** are from females (52.3% in 2017/18).
  - More females than males undertake **higher level STEM apprenticeships**.
- More females than males enrolled on **STEM adult learning** courses in 2017/18.



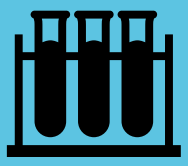
Higher Education

- The number of females enrolling on **HE STEM courses** has increased; the gap in the number of entries from females compared with males has largely closed.
  - But 58% of **HE teaching staff** in STEM-related HE areas were male and 42% female in 2017/18.
- In **biological, mathematical and physical sciences**, two-thirds of the staff were male in 2017/18, while in **engineering and technology**, 81% of staff are male.

Key findings: Education workforce

Initial Teacher Education

- Enrolments by Welsh domiciled students on **ITE courses** falling faster in STEM subjects than other subjects
  - 2010/11 - 17/18: fell by 42% among females and 47% among males.
- Most Welsh domiciled students enrolling on **DT** (75%), **Biology** (63%), and **Mathematics** (53%) ITE courses in Wales were female in 2017/18.
  - However, only 20% of those enrolling on ITE **Physics** courses were female in 2017/18.
- Only a small **minority of primary teachers (13%) have STEM-related HE qualifications**.



- **Most secondary teachers (54%) trained in STEM subjects were female**
  - This is lower than the average for secondary teachers (66% female) and teachers trained in **non-STEM subjects (73% female).**

Registered teachers and practitioners

- A lower percentage of female teachers are **subject specialists** in some subjects (i.e. the percentage of teachers who trained in the subject they teach).
  - 92% of male **DT** teachers trained in DT compared with 68% of females;
  - 52% of male **Physics** teachers trained in Physics compared with 31% of females;
  - 45% of male **ICT** teachers trained in ICT compared with 34% of females.

- Most **FE (63%)** and **Work-based Learning (WBL) (80%) STEM practitioners** are male, and in Engineering 93% of FE practitioners are male.

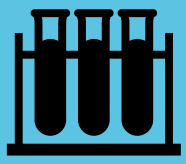
Higher Education

- 58% of **HE teaching staff** in STEM HE courses were male and 42% female in 2017/18.
  - In **biological, mathematical and physical sciences**, two-thirds of the staff were male in 2017/18, while in **engineering and technology**, 81% of staff are male.

Key findings: Employment and the labour market

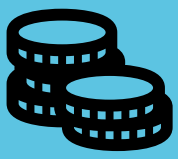
Employment

- There has been an increase in the number of females employed in **STEM occupations** in Wales.
  - However, **females remain under-represented** in STEM occupations. There are large variations by occupational sub-category.
    - 2018/19: **11,300 females** and **49,200 males** in STEM professional roles.
    - growth in the number of females in **senior IT roles** has been slower than among males.



Earnings

- The **STEM Gender Pay Gap (GPG) is closing in Wales** and the UK.
  - However, the gap is **greater in STEM occupations** than in other professions.
- Among larger companies, the GPG is **similar in STEM and non-STEM** sectors.



Enterprise and business

- Rates of **small business ownership** and **leadership** appear to be increasing among females in the STEM sector, albeit from a low base.
- Female **entrepreneurship** has increased in Wales between 2002 and 2018, though data on STEM sectors is not available.

2. Learners in compulsory education

Data relating to learners' participation and attainment during their compulsory education is set out below. This includes data from the following educational phases:

- Foundation Phase (age 3-7, nursery, reception and years 1 and 2);
- Key Stage 2 (age 8-11, years 3 - 6);
- Key Stage 3 (age 11-14, years 7 - 9);
- Key stage 4 (age 14-16, years 10 and 11).

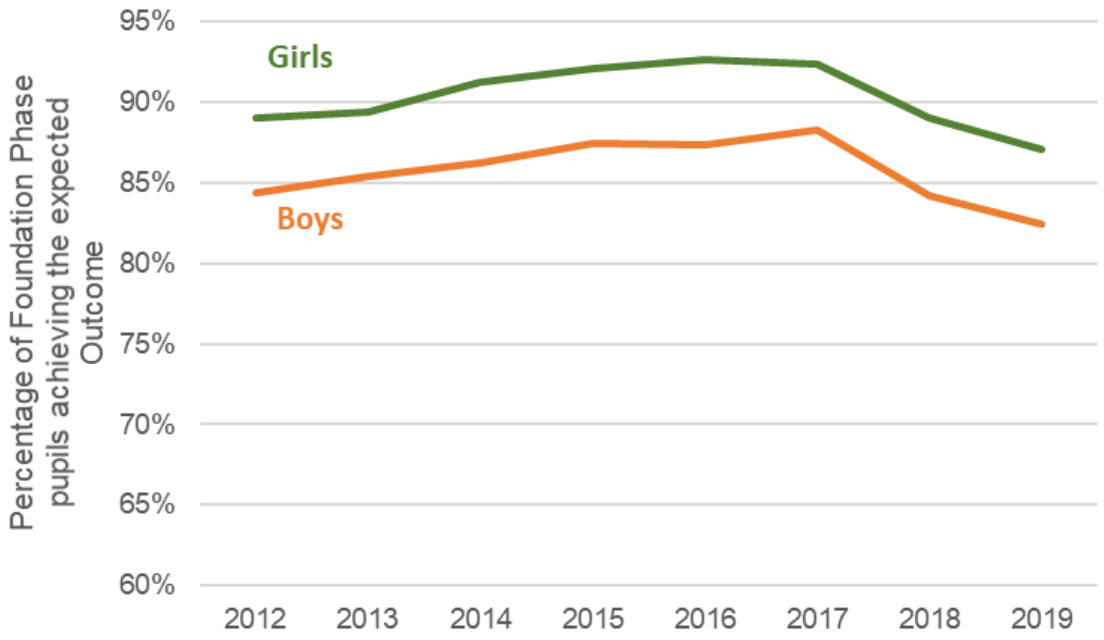
2.1 Foundation Phase assessments

All learners in their final year of the Foundation Phase in Wales are assessed by teachers in the following areas:

- Personal and social development, well-being and cultural diversity;
- Language, literacy and communication skills – English;
- Language, literacy and communication skills – Welsh;
- Mathematical development.

The data in Figure 1 show that a higher percentage of girls than boys achieve the expected outcome (Level 5 or above) in Mathematical development in each year from 2012 (the earliest year for which data are available) to 2019. On average, girls out-perform boys by around four to five percentage points each year. There was an upward trend for both girls and boys between 2012 and 2016; however, the percentage of both boys and girls achieving the expected level has fallen for girls and boys from 2017 to 2019.

Figure 1. Percentage of Foundation Phase pupils achieving the expected Outcome (Outcome 5 or above) in Mathematical development



Source: National teacher assessment data collection, Welsh Government

Data showing the percentage of girls and boys achieving each individual outcome (Levels 1-6) in Mathematical development are shown in Table 1. The data show that a higher percentage of girls than boys achieved Outcome 5 in each year from 2012-19. Boys were more likely than girls to achieve each level below the expected level (Levels 1, 2, 3 and 4) in each year. However, a higher percentage of boys than girls achieved Outcome 6 in several years (2012, 2013, 2014, 2016, 2018, 2019).

Table 1. Percentage of Foundation Phase pupils achieving the Outcomes 1-6 in Mathematical development

Measure	2012		2013		2014		2015		2016		2017		2018		2019	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Total number of pupils	16939	16021	17106	16292	17476	16699	18295	17462	17928	17029	18173	17316	18502	17759	18273	17541
Percentage achieving the expected Outcome (Outcome 5+)	84.4	**89.0**	85.4	**89.4**	86.3	**91.2**	87.5	**92.1**	87.3	**92.6**	88.3	**92.4**	84.2	**89.0**	82.5	**87.1**
Percentage achieving Outcome 6 or above	**25.7**	22.5	**29.1**	27.3	30.7	29.8	33.8	34.8	36.5	36.4	38.3	**39.2**	34.1	33.8	32.7	31.8
Percentage achieving Outcome 5	58.7	**66.5**	56.3	**62.1**	55.6	**61.4**	53.7	**57.2**	50.8	**56.2**	50.0	**53.2**	50.1	**55.2**	49.8	**55.3**
Percentage achieving Outcome 4	12.0	8.9	11.2	8.9	10.6	7.3	9.3	6.4	9.1	5.8	8.2	6.1	10.7	8.3	12.0	9.7
Percentage achieving Outcome 3	2.1	1.3	1.7	0.9	1.6	0.8	1.6	0.7	1.7	0.8	1.8	0.8	2.7	1.6	3.0	2.0
Percentage achieving Outcome 2	0.6	0.4	0.6	0.3	0.4	0.2	0.6	0.3	0.6	0.2	0.5	0.1	0.9	0.3	0.9	0.5
Percentage achieving Outcome 1	0.3	0.1	0.3	0.1	0.3	0.1	0.3	0.1	0.3	0.1	0.2	0.1	0.4	0.2	0.4	0.1
Percentage working towards Outcome 1	0.3	0.2	0.3	0.2	0.4	0.1	0.3	0.2	0.4	0.1	0.5	0.2	0.7	0.3	0.6	0.3
Percentage who have been disapplied	0.1	0.1	0.4	0.2	0.4	0.2	0.4	0.2	0.5	0.3	0.5	0.3	0.4	0.2	0.5	0.3
Percentage not awarded an outcome, and not disapplied	0.1	-	-	-	0.1	-	0.1	0.1	0.1	-	-	0.1	0.1	-	0.1	-

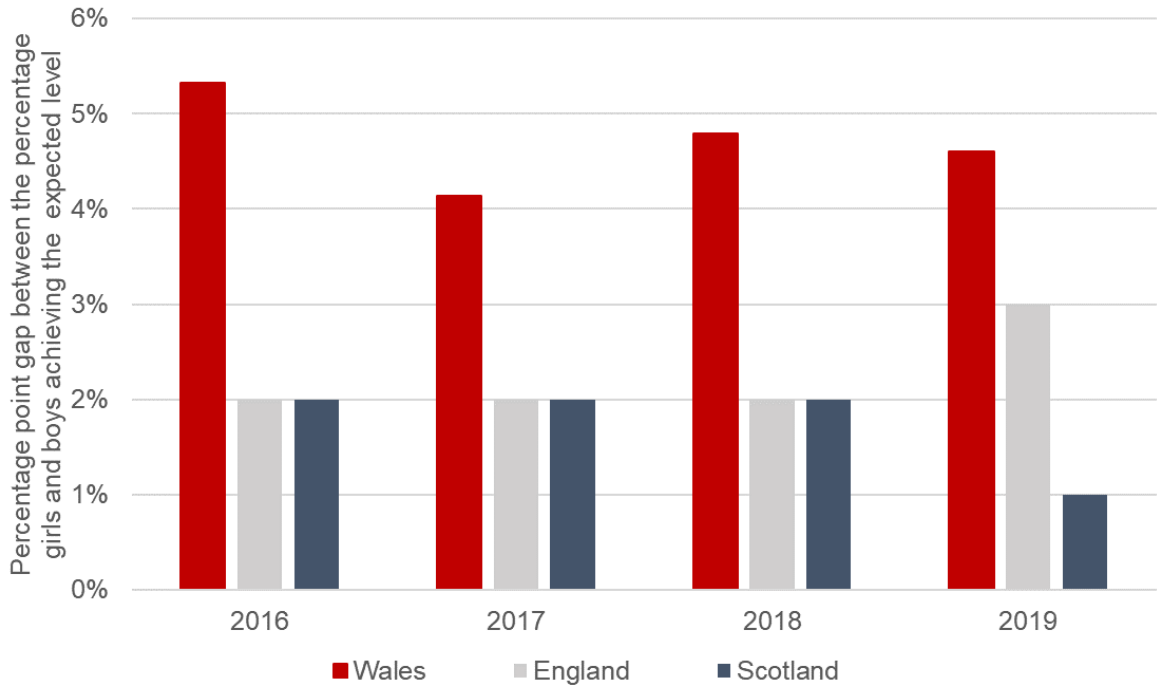
Green text denotes that girls outperform boys by more than one percentage point in terms of the percentage achieving at or above the expected level.
Orange text denotes that boys outperform girls by more than one percentage point in terms of the percentage achieving at or above the expected level.
Source: National teacher assessment data collection, Welsh Government.

2.1.1 Comparing Foundation Phase data with other nations

Foundation Phase assessment data for Wales are not directly comparable with other UK nations and regions because of the divergence in education systems since Devolution. This means that the data are not directly comparable in terms of performance, although trends in the relative patterns of attainment by gender can be compared. Similar assessments to the Foundation Phase assessments in Mathematics are undertaken at the same age in Key Stage 1 in England and Northern Ireland, with assessments of Numeracy undertaken at a slightly older age undertaken in Scotland: Primary 4 children, equivalent to Year 4 in Wales (Age 8-9).[1]

A similar pattern to Wales of girls outperforming boys can be seen in the assessment data from other UK nations. Figure 2 shows that the percentage point gender gap is higher in Wales than in England and Scotland.

Figure 2. Percentage point gap between girls and boys achieving the expected level/standard in early years Mathematics and Numeracy assessments by UK nation*



*Actual percentages achieving the expected level/standard not shown due to differences in assessment systems. Assessments undertaken at same ages in Wales and England (around age 7), but at an older age in Scotland (age 8-9). Comparably reliable data for Northern Ireland is not available (See Appendix 1).

Source: National teacher assessment data collection, Welsh Government; Phonics screening check and key stage 1 assessments: England, Department for Education; Achievement of Curriculum for Excellence levels, Scottish Government.

Data from the individual UK nations is included in Appendix 1.

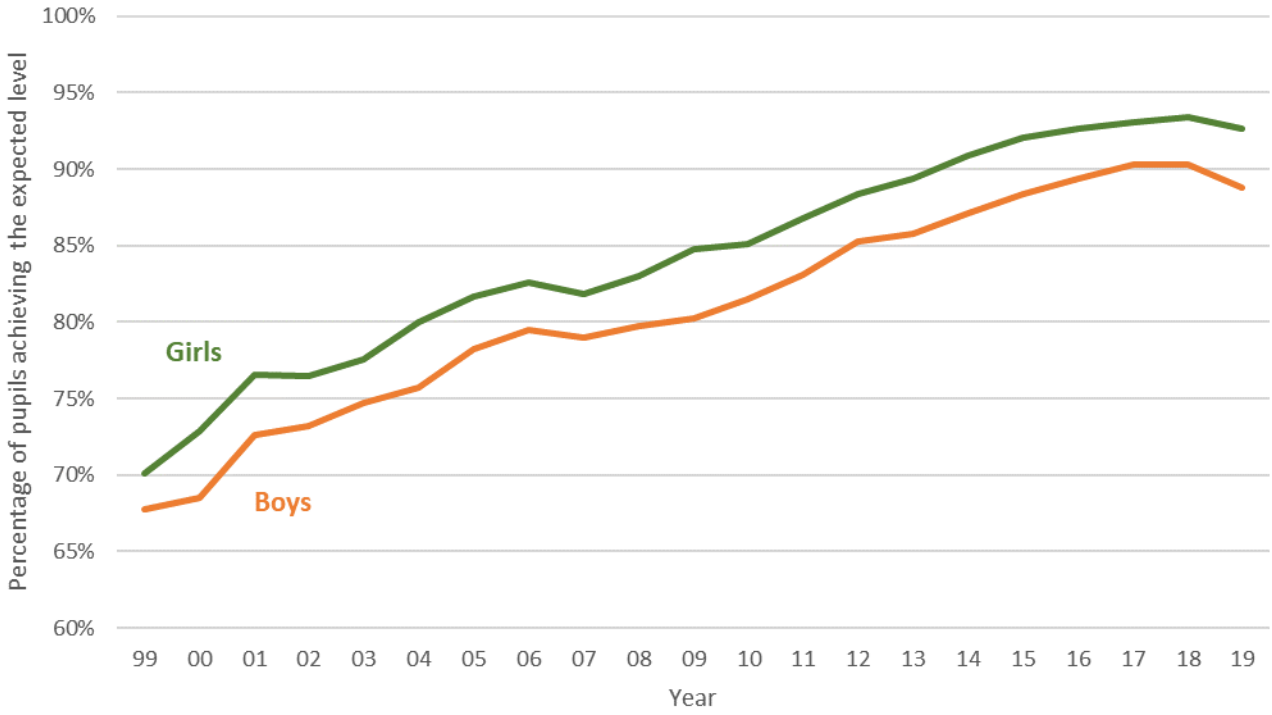
[1] The Curriculum for Wales guidance (Welsh Government, 2020) defines numeracy as “the application of mathematics to solve problems in real-world contexts”.

2.2 Key Stage 2 assessments

Statutory assessments of Year 6 pupils in English, Welsh, Maths and Science are undertaken by teachers at the end of Key Stage 2 in Wales. The most recent data show that a higher percentage of girls than boys achieve the expected level (Level 4 or above) in both Maths and Science, and that this has been the case in each year since 1999 (the earliest data available).

Figure 3 shows that there has been an upward trend in the percentages of both boys and girls achieving the expected level in both Maths and Science over the last 20 years, although the percentages for both have remained fairly static during the last five years. In 2019, 92.7 per cent of girls achieved the expected level in Maths, up from 70.1 per cent in 1999. Over the same period, the percentage of boys achieving the expected level in Maths increased from 67.8 to 88.8 per cent. The percentage of girls achieving the expected level in Maths has typically been between three and four percentage points higher than boys in each year.

Figure 3. Percentage of boys and girls achieving the expected level (Level 4 or above) in Maths at Key Stage 2 1999-2020



Source: National teacher assessment data collection, Welsh Government

The percentage of pupils achieving Levels 1-6 in Mathematics at Key Stage 2 is shown in Table 2. The data show that a higher percentage of boys than girls tend to achieve Level 6 or above (although the overall percentage of pupils achieving this level is low), while a higher percentage of girls than boys tend to achieve Level 5 and Level 4.

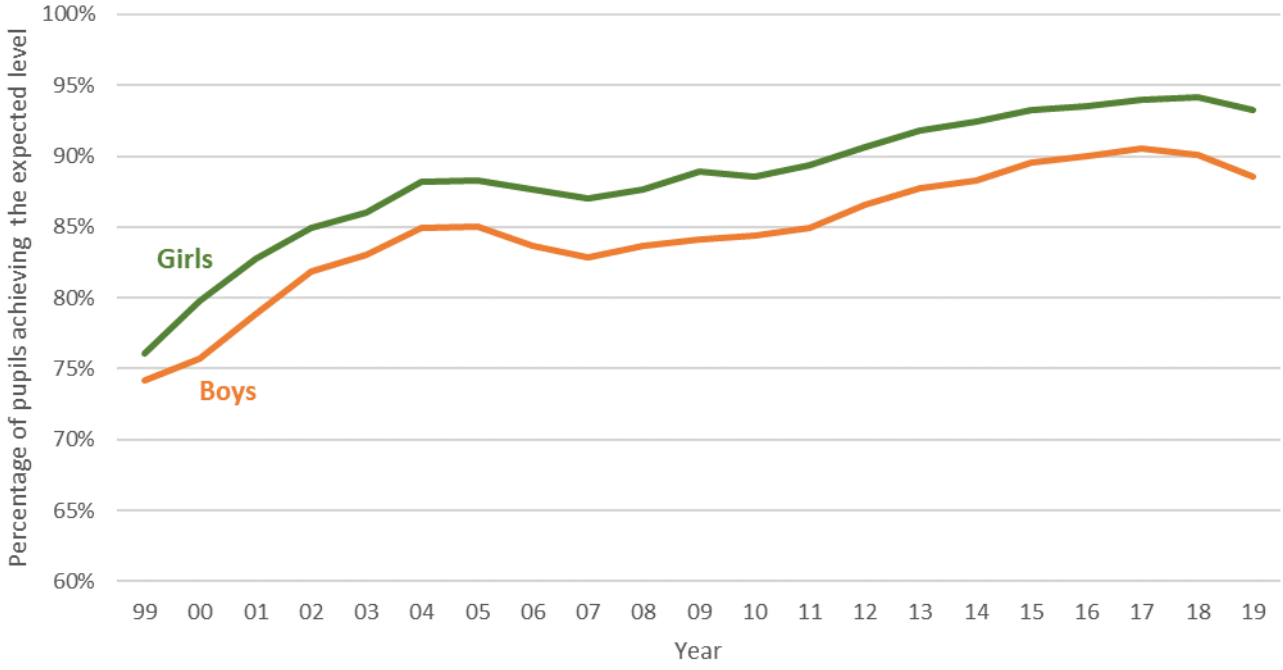
Table 2. Percentage of girls and boys achieving individual Levels 1-6 in Mathematics at Key Stage 2

Outcome / Boys (B) & Girls (G)	2009		2010		2011		2012		2013		2014		2015		2016		2017		2018		2019	
	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G
Percentage achieving the expected level (L4+)	80.3	**84.8**	81.5	**85.1**	83.1	**86.8**	85.3	**88.4**	85.8	**89.3**	87.1	**90.9**	88.4	**92.1**	89.4	**92.6**	90.3	**93.1**	90.3	**93.4**	88.8	**92.7**
Percentage achieving Level 6 or above	0.1	0.1	0.2	0.1	0.3	0.2	0.5	0.3	0.7	0.3	1.4	0.8	1.7	1.0	2.1	1.2	2.1	1.4	2.7	1.8	2.7	1.8
Percentage achieving Level 5	**30.0**	28.4	**30.2**	27.9	**32.1**	29.7	**33.0**	32.0	35.6	34.8	36.7	37.0	39.3	**40.5**	41.5	41.6	44.6	**46.0**	45.3	**46.0**	42.5	**44.6**
Percentage achieving Level 4	50.1	**56.2**	51.2	**57.1**	50.7	**57.0**	51.8	**56.1**	49.6	**54.3**	49.0	**53.0**	47.4	**50.6**	45.8	**49.8**	43.6	**45.6**	42.4	**45.6**	43.6	**46.3**
Percentage achieving Level 3	14.8	12.4	13.7	12.1	12.7	10.7	10.7	9.4	10.6	8.2	9.0	6.9	8.3	5.9	7.5	5.4	6.7	5.2	6.6	5.2	7.8	5.3
Percentage achieving Level 2	3.2	2.0	2.9	1.9	2.6	1.6	2.5	1.5	2.1	1.6	2.2	1.3	1.9	1.2	1.7	1.1	1.5	0.8	1.5	0.8	1.6	1.0
Percentage achieving Level 1	0.7	0.3	0.8	0.4	0.8	0.5	0.6	0.3	0.5	0.3	0.6	0.3	0.5	0.3	0.5	0.3	0.5	0.2	0.6	0.3	0.5	0.3
Percentage working towards Level 1	0.7	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Percentage who have been disapplied	0.3	0.1	0.4	0.2	0.2	0.2	0.2	0.1	0.3	0.2	0.5	0.3	0.3	0.2	0.5	0.3	0.5	0.3	0.4	0.2	0.5	0.2
Percentage not awarded a level, and not disapplied	0.1	-	0.2	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.3	0.1	0.3	0.2

Green text denotes that girls outperform boys by more than one percentage point in terms of the percentage achieving at or above the expected level.
Orange text denotes that boys outperform girls by more than one percentage point in terms of the percentage achieving at or above the expected level.
Source: National teacher assessment data collection, Welsh Government.

Figure 4 shows that, in Science, 93.2 per cent of girls achieved the expected level in 2019, compared with 76.1 per cent in 1999. Over the same period, the percentage of boys achieving the expected level in Science increased from 74.2 per cent to 88.5 per cent. In Science, the percentage of girls achieving the expected level has typically been between three and five percentage points higher than boys in each year.

Figure 4. Percentage of girls and boys achieving the expected level (Level 4 or above) in Science at Key Stage 2 1999-2020



Source: National teacher assessment data collection, Welsh Government

Examining the gap in the percentage achieving higher levels in Key Stage 2 Science assessments, it is clear that the gap between the percentage of girls achieving Level 5 outcomes has grown over the last seven years. Table 3 shows that, in 2011, 30.7 per cent of boys and 31.1 per cent of girls achieved Level 5 in Key Stage 2 Science. However, by 2019, 46.9 per cent of girls and 40.9 per cent of boys achieved Level 5. In contrast, the percentages of boys and girls achieving Level 4 have converged over the same period, and are now broadly similar.

Table 3. Percentage of girls and boys achieving Levels 1-6 in Science at Key Stage 2

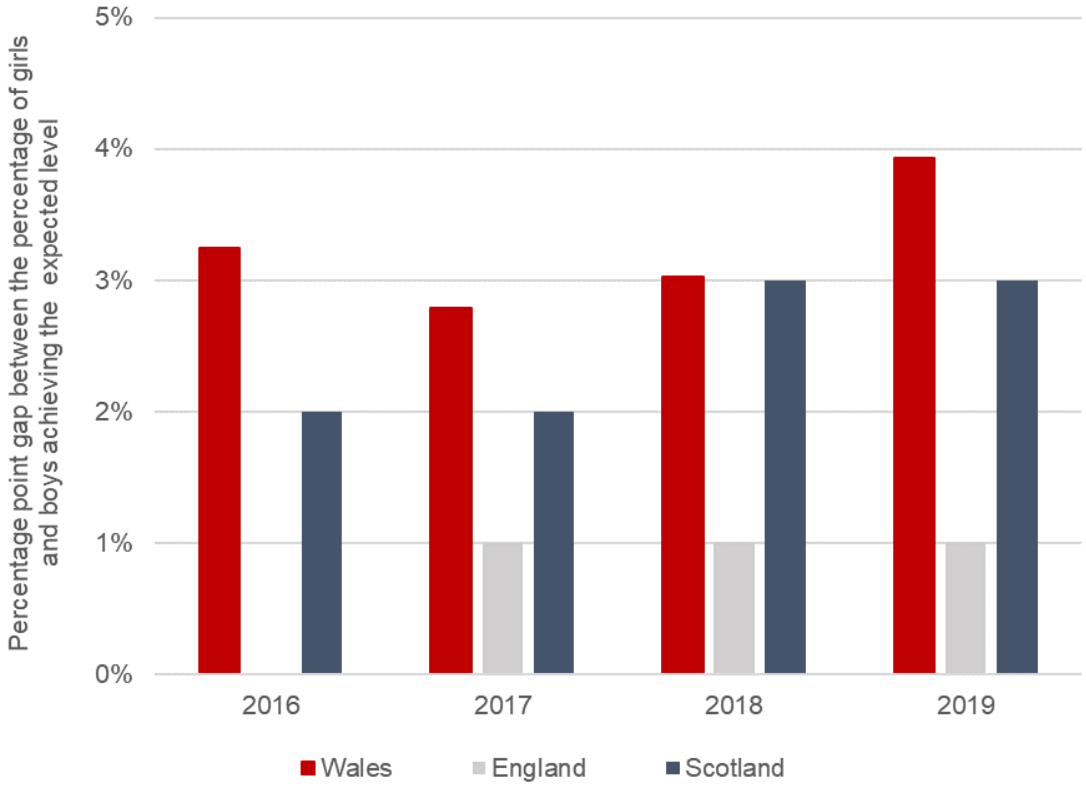
Outcome	2009		2010		2011		2012		2013		2014		2015		2016		2017		2018		2019	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Percentage achieving expected level (L4+)	84.1	**88.9**	84.4	**88.5**	85.0	**89.4**	86.6	**90.6**	87.8	**91.8**	88.3	**92.5**	89.6	**93.3**	90.0	**93.6**	90.6	**94.0**	90.1	**94.1**	88.5	**93.2**
Percentage achieving Level 6+	-	-	-	-	0.1	-	0.1	-	0.1	0.1	0.2	0.1	0.3	0.2	0.2	0.1	0.2	0.3	0.4	0.4	0.3	0.2
Percentage achieving Level 5	30.4	30.9	30.3	30.0	30.7	31.1	32.2	**34.0**	34.8	**37.4**	36.7	**39.8**	39.1	**42.9**	40.6	**44.2**	43.7	**48.9**	43.4	**48.9**	40.9	**46.9**
Percentage achieving Level 4	53.7	**57.9**	54.1	**58.5**	54.2	**58.3**	54.4	**56.6**	52.9	**54.3**	51.3	**52.5**	50.2	50.2	49.2	49.2	**46.7**	44.8	**46.3**	44.9	**47.4**	46.2
Percentage achieving Level 3	12.1	9.1	11.7	9.4	11.3	8.5	9.9	7.5	9.1	6.3	8.1	5.5	7.2	4.8	7.0	4.6	6.4	4.5	6.9	4.4	7.8	4.8
Percentage achieving Level 2	2.2	1.3	2.2	1.3	2.2	1.3	2.0	1.1	1.7	1.1	2.0	1.1	1.7	1.1	1.5	1.0	1.5	0.7	1.3	0.7	1.6	1.0
Percentage achieving Level 1	0.6	0.3	0.6	0.3	0.6	0.3	0.5	0.3	0.4	0.2	0.6	0.3	0.6	0.3	0.6	0.3	0.5	0.2	0.6	0.2	0.6	0.3
Percentage working towards Level 1 (1)	0.6	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Percentage who have been disapplied	0.3	0.1	0.4	0.2	0.2	0.2	0.2	0.1	0.3	0.2	0.5	0.3	0.3	0.2	0.5	0.3	0.5	0.3	0.4	0.2	0.5	0.2
Percentage not awarded a level, and not disapplied	0.1	-	0.2	0.1	0.1	0.1	0.3	0.1	0.3	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.1	0.3	0.1	0.3	0.2

Green text denotes that girls outperform boys by more than one percentage point in terms of the percentage achieving at or above the expected level.
Orange text denotes that boys outperform girls by more than one percentage point in terms of the percentage achieving at or above the expected level.
Source: National teacher assessment data collection, Welsh Government.

2.2.1 Comparing Key Stage 2 data with other nations

Similar data to the Key Stage 2 assessments in Wales are available for other UK nations by gender although the data are not collected in precisely the same way. This means that the data are not directly comparable in terms of performance, although trends in the relative patterns of attainment by gender can be compared. Figure 5 shows that, in Wales and Scotland, girls outperformed boys by at least two percentage points in each year between 2016 and 2019 in terms of the percentage reaching the expected level in Mathematics. There was a lower percentage point gap of 0-1 percentage points in England over the same period.

Figure 5. Percentage point gap between girls and boys achieving the expected level/standard in Key Stage 2 Mathematics (Primary 7 Numeracy in Scotland) assessments by UK nation*



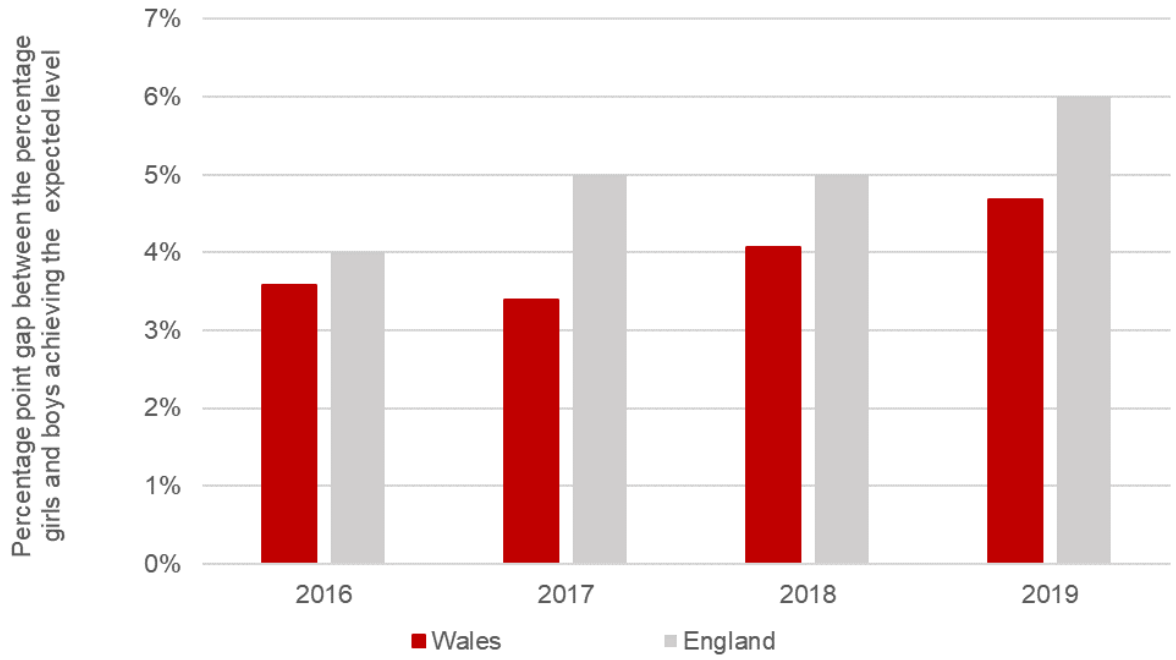
*Actual percentages achieving the expected level/standard not shown due to differences in assessment systems. Assessments undertaken at similar ages in Wales, England and Scotland (age 10-11). Comparably reliable data for Northern Ireland is not available (See Appendix 1).

Source: National teacher assessment data collection, Welsh Government; Key stage 2 assessments: England, Department for Education; Achievement of Curriculum for Excellence levels, Scottish Government.

Figure 6 shows that, in both Wales and England, the percentage of girls achieving the expected level in Science was higher than the corresponding percentage of boys in each year between 2016 and 2019. The percentage point gap in England (4-6 percentage points) was higher than in Wales (3-5 percentage points). The gap in both countries increased between 2016 and 2019.

More detailed data on Key Stage 2 Mathematics and Science assessments for each individual UK nation is included in Appendix 1.

Figure 6. Percentage point gap between girls and boys achieving the expected level/standard in Key Stage 2 Science in Wales and England*



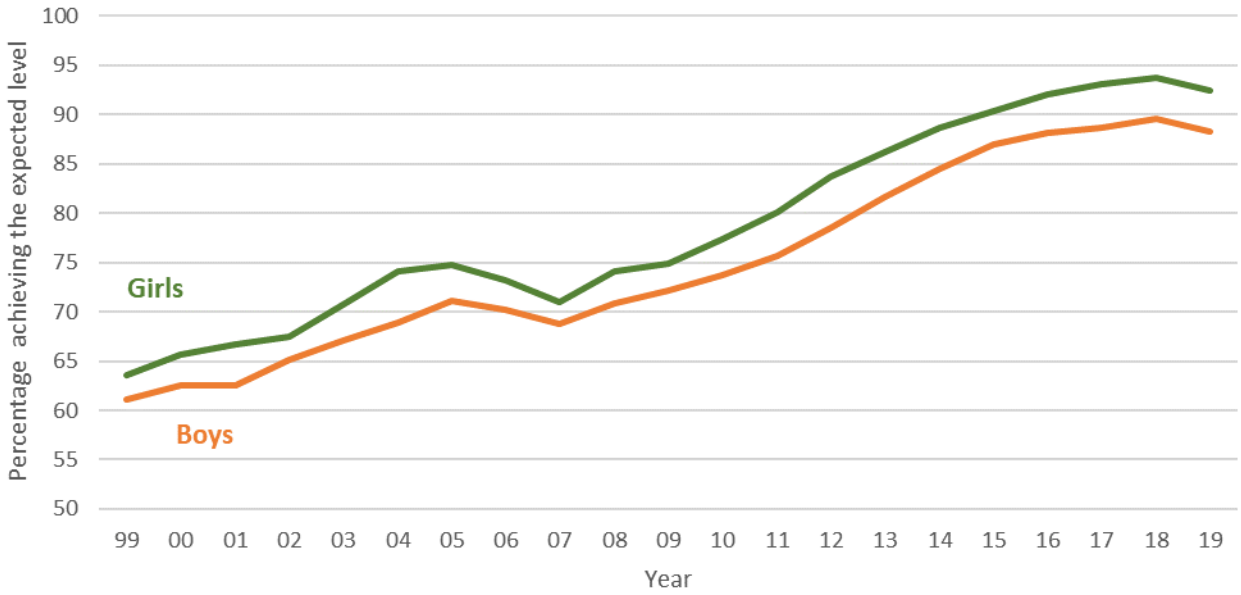
*Actual percentages achieving the expected level/standard not shown due to differences in assessment systems. Assessments undertaken at similar ages in Wales, England and Scotland (age 10-11). Comparably reliable data for Northern Ireland is not available (See Appendix 1).

Source: National teacher assessment data collection, Welsh Government; Key stage 2 assessments: England, Department for Education; Achievement of Curriculum for Excellence levels, Scottish Government.

2.3 Key Stage 3 assessments

Statutory assessments of Year 9 pupils in English, Welsh, Maths and Science are undertaken by teachers at the end of Key Stage 3 in Wales. The percentages achieving the expected level (Level 5 or above) in Maths and Science are presented in Figure 7, which shows that the percentage of girls and boys achieving the expected level in Maths at Key Stage 3 has increased over the last twenty years in Wales. Among girls, the percentage increased from 64 per cent in 1999 to 92 per cent in 2019, increasing in each year apart from 2006, 2007 and 2019. Among boys, the percentage increased from 61 in 1999 to 88 per cent in 2019. The gap between the percentage of girls and boys achieving the expected level in Maths has increased from 2.5 percentage points in 1999 to 4.2 percentage points in 2019, although it did reach 5.2 percentage points in 2012.

Figure 7. Percentage achieving the expected level (Level 5 or above) in Maths at Key Stage 3 1999-2020



Source: National teacher assessment data collection, Welsh Government

The data in Table 4 show that a higher percentage of girls than boys achieve levels higher than the expected level. In most years between 2009 and 2019 a higher percentage of girls than boys achieved Level 8 in Maths at Key Stage 3, while a higher percentage of girls achieved Levels 6 and 7 in each year over this period.

Table 4. Percentage achieving individual levels in Maths at Key Stage 3

Outcome	2009		2010		2011		2012		2013		2014		2015		2016		2017		2018		2019	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Percentage achieving the expected level (L5+)	72.1	**74.9**	73.7	**77.4**	75.7	**80.1**	78.5	**83.8**	81.6	**86.3**	84.5	**88.6**	87.0	**90.4**	88.2	**92.1**	88.7	**93.1**	89.6	**93.7**	88.3	**92.5**
Exceptional Performance	0.1	0.1	0.2	0.2	-	-	0.1	-	0.1	-	0.1	-	-	-	0.1	-	-	0.1	0.1	0.1	0.2	0.1
Percentage achieving Level 8	1.3	1.1	1.5	1.5	1.6	1.8	1.7	2.0	2.3	2.4	2.8	2.6	3.3	3.5	3.8	3.5	3.6	4.2	5.0	5.3	4.8	5.7
Percentage achieving Level 7	15.3	15.5	15.4	16.0	16.0	16.8	17.3	**18.9**	18.3	**19.7**	20.3	**22.2**	21.7	**24.2**	22.9	**26.9**	25.1	**28.6**	25.3	**29.7**	24.7	**27.3**
Percentage achieving Level 6	26.3	**27.8**	26.7	**28.6**	27.6	**29.8**	28.4	**31.0**	30.4	**33.3**	30.5	**33.9**	32.3	**34.1**	33.5	**34.9**	33.1	**36.3**	32.9	**34.5**	32.7	**35.4**
Percentage achieving Level 5	29.1	30.5	29.9	31.1	30.4	**31.6**	31.1	31.9	30.6	30.9	30.7	29.9	**29.7**	28.6	**27.9**	26.7	**26.8**	24.0	**26.3**	24.2	**25.8**	24.0
Percentage achieving Level 4	18.0	17.5	17.4	16.4	16.2	14.3	14.5	12.1	12.3	10.1	10.2	8.3	8.8	6.9	7.4	5.4	6.9	4.2	6.6	4.3	7.4	5.0
Percentage achieving Level 3	6.6	5.8	6.1	4.8	5.5	4.3	4.6	3.0	3.8	2.4	3.0	1.9	2.3	1.6	2.3	1.3	2.2	1.5	1.7	1.0	2.2	1.3
Percentage achieving Level 2	1.5	0.8	1.2	0.5	1.0	0.5	1.1	0.5	0.9	0.4	0.9	0.4	0.8	0.4	0.8	0.4	0.8	0.3	0.6	0.3	0.6	0.3
Percentage achieving Level 1	0.5	0.3	0.4	0.2	0.5	0.3	0.4	0.2	0.5	0.3	0.4	0.3	0.3	0.2	0.5	0.2	0.5	0.3	0.3	0.2	0.4	0.3
Percentage working towards Level 1	0.5	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Percentage who have been disapplied	0.2	0.1	0.2	0.1	0.1	0.1	-	-	0.2	0.1	0.2	0.1	0.2	-	0.2	0.2	0.3	0.2	0.5	0.2	0.4	0.2
Percentage not awarded a level, and not disapplied	0.5	0.3	0.5	0.3	0.5	0.3	0.4	0.2	0.4	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.3	0.2	0.4	0.2	0.4	0.3

Green text denotes that girls outperform boys by more than one percentage point in terms of the percentage achieving at or above the expected level.
Orange text denotes that boys outperform girls by more than one percentage point in terms of the percentage achieving at or above the expected level.
Source: National teacher assessment data collection, Welsh Government

Figure 8 shows that, in Science, the percentage of girls and boys achieving the expected level at Key Stage 3 has increased in the last 20 years in Wales. For girls, the percentage increased from 60 per cent in 1999 to 95 per cent in 2019, while for boys it increased from 58 to 90 per cent over the same period. The percentages for girls and boys increased in each year, apart from 2007 and 2019. The gap between the percentage of girls and boys achieving the expected level in Maths has increased from 1.9 percentage points in 1999 to 4.8 in 2019, although it did reach 7.1 percentage points in 2012.

Figure 8. Percentage achieving the expected level (Level 5 or above) in Science at Key Stage 3 1999-2020

Source: National teacher assessment data collection, Welsh Government

The data in Table 5 show that a higher percentage of girls than boys achieve levels higher than the expected level (Levels 6-8). In every year bar one (2009) between 2009 and 2019 a higher percentage of girls than boys achieved Level 8 in Science at Key Stage 3, while a higher percentage of girls achieved Levels 6 and 7 in every year over this period. The gap in the percentage of girls and boys achieving Level 7 in Science has widened from 0.6 per cent in 2009 to 9.3 per cent in 2019.

Table 5. Percentage achieving individual levels in Science at Key Stage 3

Outcome	2009		2010		2011		2012		2013		2014		2015		2016		2017		2018		2019	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Percentage achieving the expected level (L5+)	73.7	**77.5**	74.2	**80.1**	77.4	**83.4**	80.1	**87.2**	84.0	**90.1**	87.8	**93.1**	89.6	**94.1**	90.7	**95.1**	91.4	**95.8**	91.5	**96.1**	90.0	**94.9**
Exceptional Performance	-	-	0.0	0.0	0.0	0.0	-	-	-	-	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	-	0.1
Percentage achieving L8	0.1	0.1	0.1	0.3	0.3	0.4	0.4	0.5	0.6	0.9	0.9	1.3	0.9	1.6	1.0	1.6	1.0	1.8	0.9	1.8	1.5	2.4
Percentage achieving L7	10.2	**10.8**	9.1	**10.4**	9.7	**12.2**	10.3	**13.3**	12.1	**16.0**	14.9	**19.0**	16.6	**22.1**	18.4	**26.1**	21.5	**28.7**	22.6	**30.8**	21.1	**30.4**
Percentage achieving L6	26.9	**28.7**	25.6	**28.7**	25.8	**29.5**	29.2	**34.2**	31.2	**36.5**	33.7	**39.5**	35.9	**40.0**	38.1	**40.8**	37.1	**41.2**	37.7	**40.5**	37.7	**39.3**
Percentage achieving L5	36.4	**37.9**	39.4	**40.7**	41.6	41.3	40.2	39.3	**40.0**	36.7	**38.2**	33.2	**36.0**	30.3	**33.1**	26.5	**31.7**	24.0	**30.2**	22.8	**29.7**	22.6
Percentage achieving L4	18.5	17.6	18.9	16.0	16.8	13.6	14.9	10.3	11.7	8.0	8.5	5.2	7.3	4.2	6.2	3.3	5.1	2.6	5.4	2.4	6.2	3.2
Percentage achieving L3	5.3	3.6	4.5	2.7	3.7	2.0	2.7	1.4	2.3	0.9	1.6	0.7	1.3	0.7	1.2	0.6	1.4	0.5	1.1	0.5	1.4	0.7
Percentage achieving L2	0.8	0.4	0.8	0.3	0.6	0.3	0.7	0.3	0.6	0.3	0.8	0.3	0.5	0.3	0.6	0.3	0.6	0.2	0.4	0.2	0.6	0.3
Percentage achieving L1	0.4	0.2	0.4	0.2	0.3	0.2	0.5	0.2	0.4	0.2	0.3	0.2	0.4	0.2	0.4	0.2	0.4	0.3	0.3	0.2	0.3	0.2
Percentage working towards L1	0.5	0.3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Percentage who have been disapplied	0.2	0.1	0.2	0.1	0.1	0.1	-	-	0.2	0.1	0.2	0.1	0.2	0.1	0.2	0.2	0.3	0.2	0.5	0.2	0.4	0.2
Percentage not awarded a level, and not disapplied	0.6	0.4	0.5	0.3	0.5	0.3	0.5	0.2	0.4	0.2	0.2	0.2	0.3	0.2	0.3	0.2	0.4	0.2	0.5	0.2	0.5	0.3

Green text denotes that girls outperform boys by more than one percentage point in terms of the percentage achieving at or above the expected level.
Orange text denotes that boys outperform girls by more than one percentage point in terms of the percentage achieving at or above the expected level.
Source: National teacher assessment data collection, Welsh Government.

2.3.1 Comparing Key Stage 3 data with other nations

Limited comparable data for other UK nations is available for Key Stage 3. Assessments at this stage are no longer undertaken in England, but the most recent data (2012/13) show that a higher percentage of girls (73.6 per cent) than boys (69.9 per cent) were making the expected level of progress' in Mathematics.[2]

Data for Northern Ireland show that a higher percentage of girls than boys achieve higher levels of attainment (Levels 6 or 7) at Key Stage 3 in each year from 2016 to 2019.[3] Key stage assessments in 'Using ICT' are also undertaken in Northern Ireland, but not in Wales.

Data for Scotland are not directly comparable to Wales, as assessments are undertaken at different ages, and are based on Numeracy rather than Mathematics.[4] Numeracy assessments are undertaken in S3 in Scotland (equivalent to Year 10 in Wales). A similar gender gap to Wales in attainment can be observed in Scotland, with 61 per cent of girls and 56 per cent of boys achieving expected levels in Numeracy in 2018/19.[5]

2.4 GCSE entries and attainment

The Welsh Government publishes data on the number of GCSE entries and results (pupils in Year 11/pupils aged 15) by subject group and gender. The data below analyses the numbers of examination entries and results for individual subjects as well as for groups of subjects, as defined by the authors of this report in Table 6 below.

- STEM academic subjects;
- STEM vocational subjects;
- Social Sciences subjects;
- Other academic subjects;
- Other vocational subjects.

These groups are also used to analyse data on A-level entries and results in Section 2.5. Most of the subjects below are available at GCSE and A-level, although some are only available at GCSE or A-level, and this is noted next to each below.

[2] See *GCSE and equivalent results: 2012 to 2013 (provisional)*. Available at: https://www.gov.uk/government/statistics/2013-gcse-and-equivalent-results-including-key-stage-3-provisional

[3] See Key Stage 3 Assessment Statistics. Available at: http://ccea.org.uk/more/research_statistics/curriculum/key_stage_3/assessment

[4] Key Stage 3 assessments are undertaken in Year 9 in Wales.

[5] See *Achievement of Curriculum for Excellence levels: 2018*-19. Available at: https://www.gov.scot/publications/achievement-curriculum-excellence-cfe-levels-2018-19/

Table 6. Subject grouping definitions for GCSEs and A-levels

Grouping name	GCSE and/or A-level subjects included	
STEM academic subjects	Biological Sciences Chemistry Physics Single Science Science Double Award (GCSE only) Applied Science (GCSE only) Additional Science (GCSE only)	Other Sciences (GCSE only) Design and Technology (DT) (referred to in Welsh Government statistics as Craft, Design & Technology) ICT (includes Computer Science) Home Economics Mathematics Mathematics – Numeracy (GCSE only)
STEM vocational subjects	Applied Engineering (VQ) Applied ICT (VQ) Applied Science (VQ)	Construction (VQ) Manufacturing (VQ) Additional Applied Science (VQ) (GCSE only)
Social Sciences subjects	Business Studies Economics Geography	Humanities (GCSE only) Social Studies Applied Business (VQ) (6)
Other academic subjects	History Vocational Studies Art & Design Classical Studies Communication Studies Drama English Language English Literature English Second Language (GCSE only) French	German Spanish Other Modern Foreign Languages Music Physical Education Religious Studies Welsh Welsh Literature (GCSE only) Welsh Second Language General Studies (A-level only)
Other vocational subjects	Applied PE (VQ) Health & Social Care (VQ) Hospitality & Catering (VQ) Leisure & Tourism (VQ) (GCSE only) Leisure & Recreation (VQ) (A-level only)	Travel & Tourism (VQ) (A-level only) Media: Communication & Production (VQ) Performing Arts (VQ) Applied Art & Design (VQ)

Source: Authors' categorisation of subjects

2.4.1 GCSE entries

The Welsh Government publishes the number of entries for individual GCSE subjects annually, and the data are available for the academic years 2008/09 to 2018/19. The most recent data for 2018/19 shows that some subjects are predominantly chosen by girls, and others by boys. Subjects where more than 55 per cent of GCSE entries in 2018/19 were from boys or girls are shown in Figure 9.

Figure 9. GCSE subjects where more than 55 per cent of entries in 2018/19 were from boys or girls

> 55% GCSE entries were boys	> 55% GCSE entries were girls
Other Science 78%	Performing Arts (VQ) 94%
Classical Studies 73%	Health & Social Care (VQ) 96%
ICT 71%	Home Economics 80%
Design and Technology (DT) 70%*	Social Studies 73%
Business Studies 61%	Art & Design 69%
Physical Education 61%	Drama 64%
Applied Science 58%	French 66%
Geography 56%	German 58%
	Hospitality & Catering (VQ) 67%
	Spanish 67%
	Music 60%
	Humanities 57%
	Religious Studies 57%
	Welsh Literature 56%

*DT is referred to as Craft, Design and Technology in Welsh Government statistics.

Note: VQ denotes Vocational Qualification

Table 7 shows the number of GCSE entries for each subject by gender in 2018/19, as well as the percentage share of entries within each subject who were boys and girls. The subject groupings defined in Table 6 have been used to summarise the data.

The data show a fairly equal share of GCSE entries by gender in STEM academic subjects; STEM vocational subjects and Other academic subjects. However, 57 per cent of Social Sciences entries were from boys in 2018/19, while 93 per cent of entries in Other vocational subjects were from girls.

Table 7. Number and percentage share of GCSE entries 2018/19 by gender

Subjects and subject groups		Number of entries		Percentage share of all entries	
		Boys	Girls	Boys	Girls
All Subjects		**139348**	**142771**	**49%**	**51%**
STEM Academic	Biological Sciences	3460	3600	49%	51%
	Chemistry	3433	3578	49%	51%
	Physics	3361	3435	49%	51%
	Science (Double Award)	20094	19650	51%	49%
	Applied Science	413	300	58%	42%
	Other Science	25	7	78%	22%
	Design and Technology (DT)*	3377	1469	70%	30%
	ICT	5293	2165	71%	29%
	Home Economics	709	2882	20%	80%
	Mathematics	15562	14930	51%	49%
	Mathematics - Numeracy	15292	14748	51%	49%
	STEM Academic total	**71019**	**66764**	**52%**	**48%**
Social Sciences	Business Studies	1769	1133	61%	39%
	Geography	3992	3169	56%	44%
	Humanities	41	54	43%	57%
	Social Studies	13	36	27%	73%
	Applied Business (VQ)	26	23	53%	47%
	Social Sciences total	**5841**	**4415**	**57%**	**43%**
Other Academic	History	4208	5189	45%	55%
	Art & Design	2605	5901	31%	69%
	Classical Studies	8	3	73%	27%
	Communication Studies	718	719	50%	50%
	Drama	804	1425	36%	64%
	English Language	15348	14850	51%	49%
	English Literature	11813	12651	48%	52%
	French	1007	1937	34%	66%
	German	237	324	42%	58%
	Spanish	434	885	33%	67%
	Other Modern Foreign Languages	152	152	50%	50%
	Music	849	1268	40%	60%
	Physical Education	4031	2546	61%	39%
	Religious Studies	4365	5833	43%	57%
	Welsh	2615	2770	49%	51%
	Welsh Literature	1613	2052	44%	56%
	Welsh Second Language	10002	10268	49%	51%
	Other Academic total	**60811**	**68773**	**47%**	**53%**
STEM Vocational	Applied Science (VQ)	1560	1266	55%	45%
	STEM Vocational total	**1560**	**1266**	**55%**	**45%**
Other Vocational	Health & Social Care (VQ)	62	1442	4%	96%
	Hospitality & Catering (VQ)	30	62	33%	67%
	Leisure & Tourism (VQ)	23	20	53%	47%
	Performing Arts (VQ)	2	29	6%	94%
	Other Vocational total	**117**	**1553**	**7%**	**93%**

*DT is referred to as CDT in Welsh Government official statistics.

Green text denotes that more than 55% of entries were from girls.

Orange text denotes that more than 55% of entries were from boys.

Source: Welsh Examinations Database, Welsh Government (via Awarding Organisations and a contracted collection body) and Pupil Level Annual School Census (PLASC), Welsh Government.

A change in the Welsh Government's collection methodology in 2016/17 means that trend analysis of GCSE entry data should be treated with caution.[6] While it is possible to compare trends by gender over time, comparisons of individual subjects or groups of subjects may be affected by factors such as changes in the courses available and offered by schools.

The overall number of GCSE entries across all subjects fell by 8.5 per cent among girls and by 5.5 per cent among boys between 2008/09 and 2018/19. In some subjects, the percentage change in the number of GCSE entries was notably different between boys and girls. Figure 10 shows that the percentage increase in the number of GCSE entries in core Science subjects was higher among girls than boys. The full dataset is included in Table 29 in Appendix 1.

Figure 10. Subjects where changes in the number of GCSE entries were notably different among girls and boys 2008/09 to 2018/19*

Percentage increase in entries was notably higher among girls	Percentage increase in entries was notably higher among boys
Biological Sciences Chemistry Physics	Welsh Second Language
Percentage decrease in entries was notably lower among girls	**Percentage decrease in entries was notably lower among boys**
Home Economics History Art & Design Music Religious Studies	ICT Business Studies

*Notably different defined as a difference of over ten percentage points between boys and girls.
Source: Welsh Examinations Database, Welsh Government (via Awarding Organisations and a contracted collection body) and Pupil Level Annual School Census (PLASC), Welsh Government

The higher percentage increase in the number of girls entering core Science subject GCSEs is reflected in the percentage share of entries from girls and boys. This can be seen in Table 8, which also shows that:

- More girls than boys now enter each of the GCSE core Science subjects;
  - Biological Sciences (51.0 per cent girls in 2018/19);
  - Chemistry (51.0 per cent girls in 2018/19);
  - Physics (50.5 per cent girls in 2018/19);
- Over three-quarters of entries to Other Sciences were boys in each year from 2012/13 to 2018/19;
- Around two-thirds of DT entries were from boys in each year from 2012/13 to 2018/19;
- The percentage share of ICT entries from boys has increased from 59.4 per cent in 2012/13 to 71.0 per cent in 2018/19.

[6] Data for 2008/9 to 2015/16 is for 15-year-olds. Data for 2016/17 onwards is for Year 11 pupils.

Table 8. Percentage share by gender of the number of entries for GCSE examinations in STEM academic subjects 2012/13 - 2018/19

Subject	2012/13		2013/14		2014/15		2015/16		2016/17		2017/18		2018/19	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
All Subjects	132830	138951	126038	132831	121920	129710	118970	125722	134660	139145	134763	137773	139348	142771
Biological Sciences	52.2%	47.8%	51.3%	48.7%	51.8%	48.2%	51.5%	48.5%	50.3%	49.7%	48.9%	51.1%	49.0%	51.0%
Chemistry	52.8%	47.2%	51.5%	48.5%	52.6%	47.4%	51.4%	48.6%	50.3%	49.7%	48.7%	51.3%	49.0%	51.0%
Physics	53.4%	46.6%	51.9%	48.1%	52.6%	47.4%	52.0%	48.0%	50.9%	49.1%	49.3%	50.7%	49.5%	50.5%
Single Science	50.0%	50.0%	49.4%	50.6%	48.6%	51.4%	49.2%	50.8%	50.4%	49.6%	-	-	-	-
Science (Double Award)	-	-	-	-	-	-	-	-	-	-	51.1%	48.9%	50.6%	49.4%
Applied Science	-	-	-	-	-	-	-	-	-	-	61.9%	38.1%	57.9%	42.1%
Additional Science	49.1%	50.9%	48.7%	51.3%	47.8%	52.2%	48.0%	52.0%	49.6%	50.4%	-	-	-	-
Other Sciences	77.9%	22.1%	81.8%	18.2%	80.3%	19.7%	84.8%	15.2%	86.6%	13.4%	84.2%	15.8%	78.1%	21.9%
Design & Technology	66.0%	34.0%	67.5%	32.5%	66.2%	33.8%	66.4%	33.6%	67.1%	32.9%	71.0%	29.0%	69.7%	30.3%
ICT	59.4%	40.6%	60.7%	39.3%	65.7%	34.3%	66.4%	33.6%	69.8%	30.2%	70.2%	29.8%	71.0%	29.0%
Home Economics	7.7%	92.3%	7.4%	92.6%	9.2%	90.8%	8.5%	91.5%	7.9%	92.1%	18.6%	81.4%	19.7%	80.3%
Mathematics	50.8%	49.2%	50.8%	49.2%	50.7%	49.3%	51.0%	49.0%	51.1%	48.9%	51.2%	48.8%	51.0%	49.0%
Mathematics - Numeracy	-	-	-	-	-	-	-	-	51.0%	49.0%	51.2%	48.8%	50.9%	49.1%

*DT is referred to as Craft, Design and Technology in Welsh Government statistics

Green text denotes that more than 55% of entries were from girls. **Orange text** denotes that more than 55% of entries were from boys.

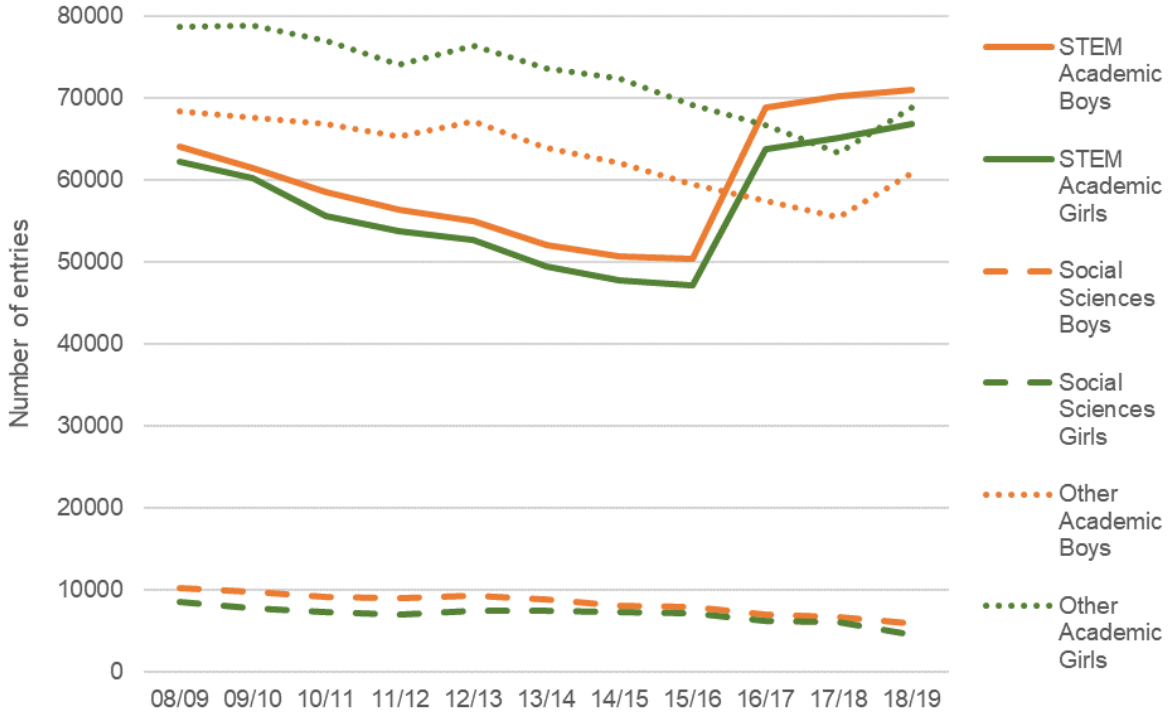
Data for years prior to 2012/13 not shown for presentational reasons.

Source: Welsh Examinations Database, Welsh Government (via Awarding Organisations and a contracted collection body) and Pupil Level Annual School Census (PLASC), Welsh Government.

By aggregating the number of entries by individual subject into the groupings defined in Table 6, it is possible to examine trends over time within these groupings. Figure 11 shows the number of GCSE entries for STEM academic subjects, social science subjects and other academic subjects by gender between 2008/09 and 2018/19, while Figure 12 shows the same data for STEM and other vocational courses. The data show that:

- In STEM academic subjects, the percentage of entries increased by 7.3 per cent among girls and 10.9 per cent among boys over the same period.
    - The increase in the number of examination entries for STEM academic subjects has mainly been driven by increases in the number of entries in Science subjects over this period.
- Entries in Social Science GCSEs, STEM vocational subjects and other vocational subjects fell significantly over this period, while the number of entries in other academic subjects also fell.

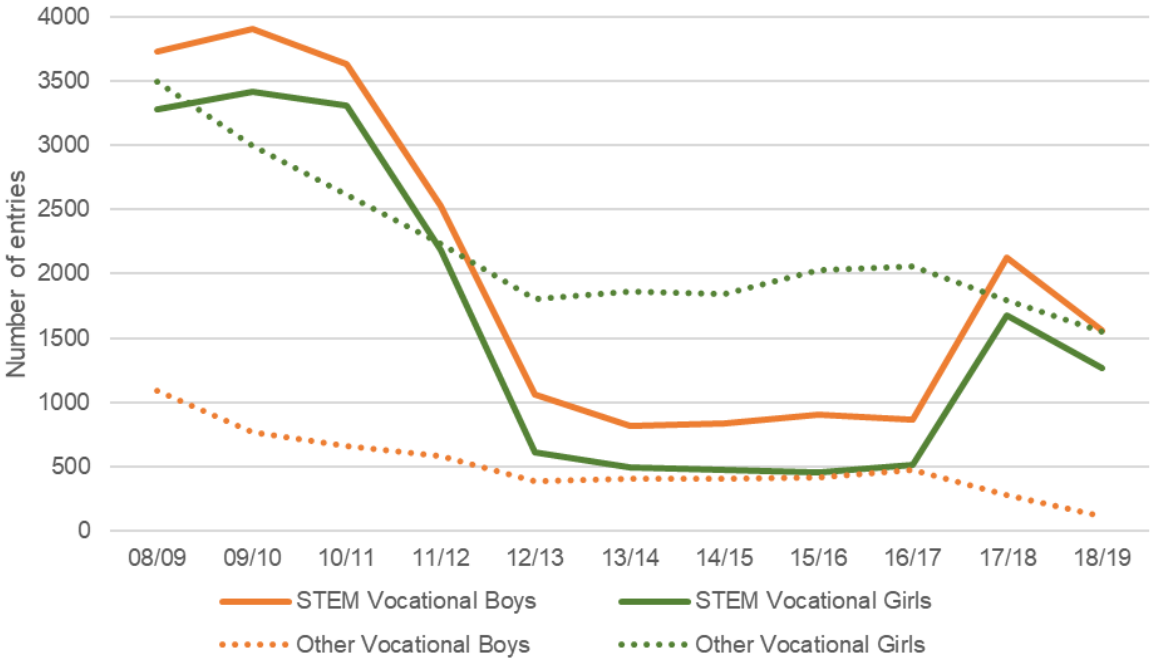
Figure 11. Number of GCSE entries for STEM academic subjects, social science subjects and other academic subjects by gender 2008/09 – 2018/19*



*Defined as Biological Sciences, Chemistry, Physics, Single Science, Science (Double Award), Applied Science, Additional Science, Other Sciences, DT (Craft, Design & Technology in Welsh Government statistics), ICT, Home Economics, Mathematics, Mathematics – Numeracy.

Source: Welsh Examinations Database, Welsh Government (via Awarding Organisations and a contracted collection body) and Pupil Level Annual School Census (PLASC), Welsh Government

Figure 12. Number of GCSE entries for STEM vocational subjects and other vocational subjects 2008/09 – 2018/19*



Source: Welsh Examinations Database, Welsh Government (via Awarding Organisations and a contracted collection body) and Pupil Level Annual School Census (PLASC), Welsh Government

2.4.2 GCSE attainment

Across all subjects, a significantly higher percentage of girls than boys achieve a GCSE A*-C grade. This is also the case for most STEM academic subjects in each year since 2008/09, with a higher percentage of girls than boys achieving an A-C* grade in most STEM academic subjects. In 2018/19, the only exceptions to this were Chemistry, Physics, Other Sciences and Numeracy.

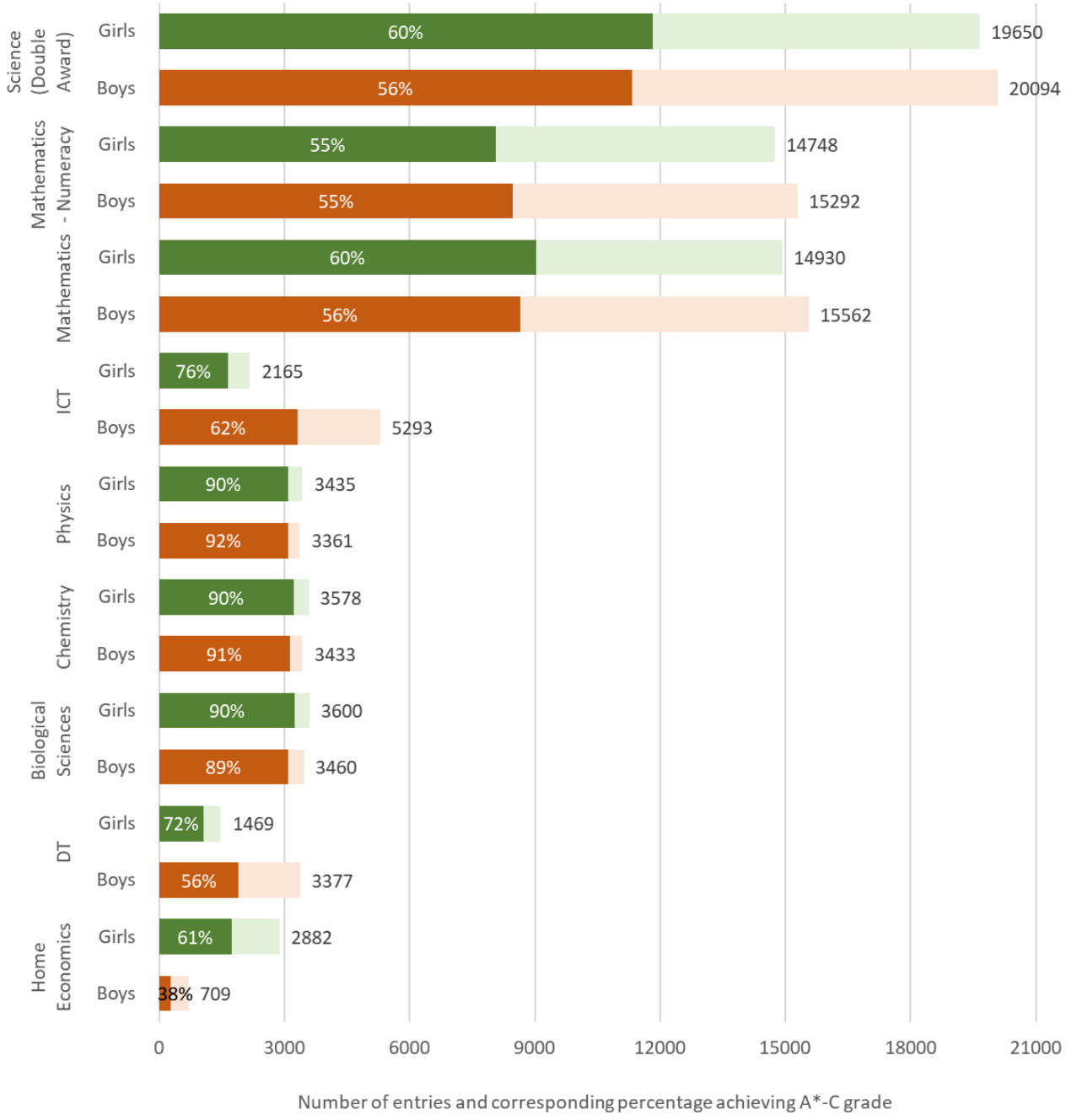
Figure **13** shows the number of pupils entered for GCSE examinations in STEM academic subjects, along with the corresponding percentage achieving an A*-C grade in 2018/19. Table 9 shows the percentage of girls and boys achieving each individual grade in 2018/19. It is notable from Figure 13 and Table 9 that:

- girls outperformed boys in terms of the percentage achieving an A*, A or A*-C grade in most subjects, significantly so in ICT, Design and Technology and Home Economics;[7]
- more than double the number of boys entered GCSE ICT and Design and Technology GCSEs compared with girls, although a significantly higher percentage of girls attained an A*-C grade in these subjects;
- a higher percentage of girls than boys achieved an A* and A grades in Chemistry, despite a higher percentage of boys achieving an A*-C;

[7] Design and Technology is referred to as Craft, Design and Technology in Welsh Government statistics.

- a significantly higher percentage of boys than girls achieved an A* grade in Physics.

Figure 13. Number of pupils entered for GCSE examinations in STEM academic subjects and corresponding percentage achieving A*-C grade 2018/19



Note: Applied Science and Other Science are excluded from the above because of the small numbers entering these subjects.
Source: Welsh Examinations Database, Welsh Government (via Awarding Organisations and a contracted collection body) and Pupil Level Annual School Census (PLASC), Welsh Government

Table 9. Percentage of pupils achieving each grade at GCSE level in STEM academic subjects 2018/19

Subject	Percentage of pupils achieving each grade																		Number of entries	
	A*		A		B		C		D		E		F		G		A*-C			
	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G
Home Economics	0.6	2.1	4.1	9.9	10.4	22.7	22.6	25.9	31.0	19.8	17.1	11.0	9.7	4.8	2.8	2.0	37.7	60.6	709	2882
Design & Technology*	2.4	7.5	8.9	17.6	19.8	24.4	25.1	22.9	18.5	13.8	11.5	7.4	8.0	3.9	3.6	1.6	56.2	72.4	3377	1469
Physics	24.0	18.3	22.4	21.3	24.4	26.6	21.2	23.8	5.0	6.6	1.2	1.6	1.0	1.1	0.4	0.5	89.3	90.4	3361	3435
Chemistry	18.9	20.0	23.6	24.8	27.8	25.9	20.6	19.5	4.8	5.6	1.9	1.7	1.2	1.1	0.6	0.9	91.0	90.2	3433	3578
Biological Sciences	16.1	19.8	22.5	26.1	27.9	25.9	22.8	18.6	6.4	5.6	1.7	1.8	0.8	0.8	0.6	0.6	92.0	90.0	3460	3600
ICT	3.9	4.8	13.1	20.0	20.9	25.8	24.6	25.4	14.6	12.9	9.6	6.1	6.7	2.5	4.4	1.7	62.5	76.0	5293	2165
Mathematics - Numeracy	7.1	5.5	8.9	8.9	17.5	17.5	21.9	22.7	13.0	13.6	13.1	13.9	6.1	5.5	5.7	5.0	55.5	60.4	15292	14748
Mathematics	8.4	9.1	8.6	9.7	16.2	18.1	22.3	23.5	14.1	13.6	10.6	10.1	6.7	5.1	6.5	5.2	55.4	54.6	15562	14930
Science (Double Award)	2.3	3.0	5.8	7.7	19.5	21.5	28.8	28.0	14.3	14.8	10.3	9.6	8.3	7.4	5.1	4.4	56.4	60.2	20094	19650

Green text denotes subjects where girls outperform boys by at least one percentage point in terms of the percentage obtaining grades A*, A, B or C.
Orange text denotes subjects where boys outperform girls by at least one percentage point in terms of the percentage obtaining grades A*, A, B or C.
*Design and Technology is referred to as Craft, Design and Technology in Welsh Government statistics and can include GCSE subjects such as Design & Technology, D&T Textiles Technology, D&T Food Technology, D&T Electronic Products, D&T Graphic Products, D&T Resistant Materials, D&T Systems & Control, D&T Engineering, D&T Product Design and/or Motor Vehicle Studies
Note: Applied Science and Other Science are excluded from the above because of the small numbers entering these subjects.
Source: Welsh Examinations Database, Welsh Government (via Awarding Organisations and a contracted collection body) and Pupil Level Annual School Census (PLASC), Welsh Government

2.4.3 Comparing GCSE data with other nations

In other UK nations, some similar patterns to Wales can be observed in the number of entries for GCSEs and National 5 (equivalent to GCSE in Scotland) examinations by gender. Table 10 shows the most recent data available (2019), and shows that:

- Fairly equal numbers of boys and girls enter **Chemistry** and **Mathematics** in all four nations, and **Science: Double Award** in Wales, England and Northern Ireland (not offered in Scotland);
- A significantly higher share (65-92 per cent) of entries into **Computing and ICT**, **DT**, **Other Sciences** and **Engineering** are boys in all four nations;

There are also some notable differences between Wales and Scotland, particularly in the gender balance of entries for Biology and Physics GCSE and National 5 examinations:

- **Biology**;
  - In Wales, just over half (51 per cent) of entries were from girls, with just under half from boys (49 per cent);
  - In Scotland, two-thirds of Biology National 5 entries (66 per cent) were from girls, with a third (34 per cent) from boys;
- **Physics**
  - In Wales, half of entries (50 per cent) were from girls, with half from boys (50 per cent);
  - In Scotland, just over a quarter (29 per cent) of entries were from girls, with almost three-quarters (71 per cent) from boys.
  - In Northern Ireland, 60 per cent of entries were from boys, with 40 per cent from girls.

Table 10. Percentage share of GCSE or National 5 qualification subject entries by gender and UK nation

Subject or grouping	Wales		England		Scotland		Northern Ireland		UK	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Computing and ICT	71%	29%	78%	22%	80%	20%	65%	35%	77%	23%
DT	71%	29%	70%	30%	74%	26%	70%	30%	70%	30%
Other Sciences	89%	11%	77%	23%	-	-	68%	32%	77%	23%
Engineering	-	-	89%	11%	90%	10%	92%	8%	90%	10%
Biology	49%	51%	50%	50%	34%	66%	46%	54%	50%	50%
Physics	50%	50%	51%	49%	71%	29%	60%	40%	51%	49%
Chemistry	49%	51%	51%	49%	47%	53%	50%	50%	51%	49%
Mathematics	49%	51%	50%	50%	47%	53%	49%	51%	50%	50%
Science: Double Award	51%	49%	50%	50%	-	-	47%	53%	50%	50%
All subjects	**49%**	**51%**	**50%**	**50%**	**49%**	**51%**	**49%**	**51%**	**50%**	**50%**

Green text denotes that more than 55% of entries were from girls. **Orange text** denotes that more than 55% of entries were from boys.

Note: Computing and ICT includes Computer Science, Computing Science, Computing or ICT. DT includes CDT (Welsh Government data), Design and Technology or Design and Manufacture. Engineering includes Engineering Science in Scotland.

Source: Joint Council for Qualifications: Provisional GCSE (Full Course) Results - June 2019; Scottish Qualifications Authority – Attainment Statistics (August) 2019

Table 11 shows GCSE attainment data in STEM subjects by UK nation (National 5 examinations in Scotland). It shows the percentage of girls and boys entered who attain GCSE grades A or above (Grade 7 in England) and GCSE grade C or above (Grade 4 in England) in individual GCSE STEM subjects.

The data show that:

- Girls outperform boys in most subjects across all four nations in terms of the percentage achieving A and A*-C grades (or equivalent) in GCSE STEM subjects.
    - Girls outperform boys in **DT**, **Biology**, **Chemistry**, **Science: Double Award, Computing** and **ICT** in all four nations;
- Girls outperform boys in **Other Sciences** in Wales, but not in England and Northern Ireland, where a higher percentage of boys attain the A and C grades or above;
- Boys outperform girls in terms of achieving grade A/7 in GCSE **Physics,** but girls outperform boys in Scotland and Northern Ireland;
- A more even picture is apparent in **Mathematics**, with fairly small differences in attainment by gender.

Table 11. Percentage of girls and boys attaining grades 7/A or above and 4/C or above in GCSE and National 5 examinations by subject and UK nation

Subject or grouping	Percentage of GCSE entries achieving each grade or above by UK nation																			
	Wales				England				Scotland				Northern Ireland				UK			
	Grade 7/A		Grade 4/C		Grade 7/A		Grade 4/C		Grade 7/A		Grade 4/C		Grade 7/A		Grade 4/C		Grade 7/A		Grade 4/C	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Computing	21.4	22.3	57.8	66.7	20.6	24.9	61.7	66.2	29.7	38.8	73.3	80.4	44.0	52.9	88.7	86.3	20.8	24.9	61.7	96.7
ICT	15.5	25.9	65.2	76.9									35.1	45.8	81	86.1	23.3	34.3	71.4	80.8
DT	11.4	26.2	57	73.5	15.6	28.3	58.4	74.6	14.3	28.8	66.7	81.0	19.9	35.2	76.8	86.8	15.5	28.5	59.1	75
Other Sciences	27.1	40	71	75	44.8	33.5	82	79					26.9	16.7	78.9	77.4	41.4	31.9	80.5	78.6
Engineering					9.7	24.4	48.1	70.8	46.4	62.7	83.0	90.7	13.3	15	63.6	65	10.3	23.4	50.5	70.1
Biology	39.7	46	89	89.8	40.4	44.2	88.9	90.3	27.5	30.5	69.5	71.1	46.8	51	95.3	94.4	40.5	44.3	89	90.3
Physics	47.5	40.8	92	90.2	45.7	41.8	90.9	90.7	28.0	41.2	71.7	81.8	52.6	60.8	95.7	98.7	45.9	42	91.1	90.8
Chemistry	43.4	45.8	91	90.3	42.9	45	89.5	90.6	33.4	35.6	76.9	76.9	52.4	63.4	93.4	96.9	43	45.3	89.6	90.7
Mathematics	12.8	13.3	48.7	51.1	16.6	15.2	60.1	59.2	30.9	30.9	65.2	65.8	24	27.1	70.3	72.3	16.7	15.5	59.9	59.2
Science: Double Award	5.6	7.9	50.4	54.4	6.6	8.5	52.9	58					20.9	27.5	86.6	90.1	6.8	8.8	53.4	58.5
All subjects	14.6	22	57.8	67.6	17.5	23.8	62.7	71.5	30.8	39.2	76.0	80.2	25	35.7	78.5	85.6	17.6	24.1	62.9	71.7

Green text denotes subjects where girls outperform boys by at least one percentage point in terms of the percentage obtaining grades A/7 and C/4 or above.

Orange text denotes subjects where boys outperform girls by at least one percentage point in terms of the percentage obtaining grades A/7 and C/4 or above.

Note: Computing and ICT includes Computer Science, Computing Science, Computing or ICT. DT includes CDT (Welsh Government data), Design and Technology or Design and Manufacture. Engineering includes Engineering Science in Scotland.

Source: Joint Council for Qualifications: Provisional GCSE (Full Course) Results - June 2019; Scottish Qualifications Authority – Attainment Statistics (August) 2019.

2.5 Career aspirations

Careers Wales undertake a 'Career Check' survey annually which gathers a snapshot of young people's views, attitudes, support needs, confidence and aspirations in relation to their future education, employment or training goals. The purpose of the survey is to provide careers advisers with baseline information at individual level to inform targeted work with pupils during Year 10 and 11. The survey gathers data from most pupils during Year 10, although occasionally data are collected during Year 9 or 11 if, for logistical reasons, they cannot be collected during Year 10.

The Career Check survey includes 22 questions. One of the survey's questions asks young people which, from a list of 30 career areas, are of interest to them; pupils can select up to four responses from this list. The occupational categories are based on SOC codes.[8]

Young people complete the survey online, with most completing it individually during a group session facilitated by a careers adviser in school. Some pupils complete it independently if they are unable to attend a facilitated session (e.g. they may be sent a text with a link to complete the survey).

Careers Wales aim to gather Career Check data from as many Year 10 pupils as possible, but responses are typically received from around 80 per cent of all pupils. Although this is a large sample and a high response rate, there are some limitations to the data.

- Firstly, the survey is based on a convenience sample (i.e. all those who are willing and able to complete it) and the data are not weighted therefore it cannot be assumed to be representative of the population of pupils.
- Secondly, the survey is focused at the individual level and not designed to be a tool to gather validated aggregate data from young people.
- Thirdly, the survey is not administered in a systematic way; for example, data can be gathered at different points (Year 9, 10 or 11) which may influence pupils' responses, and data are gathered in different situations (e.g. most in facilitated group sessions, some individually).
- Finally, the data are gathered prior to any targeted interventions from Careers Wales staff (i.e. it is a baseline or diagnostic survey). This means that young people's views have not yet been informed by discussions with careers advisers about the education or employment opportunities that are available.

These limitations mean that results should be treated with some caution. However, the data are based on a large sample and can be analysed to provide valuable indicative results at national and regional levels.

Data for 2017, 2018 and 2019 show some patterns by gender:

- Higher percentages of females consistently selecting some STEM-related career areas as their first choice;
    - notably **Health and Medical** and **Animal Care.**

[8] The Standard Occupational Classification (SOC) is a common classification of occupational information for the UK.

- A higher percentage of males tend to select other STEM-related career areas as their first choice
    - notably **Engineering**, **Computers**, **Software and IT** and **Building and Construction**.

The top five career areas selected by male and female pupils in 2019 are shown in Table 12.

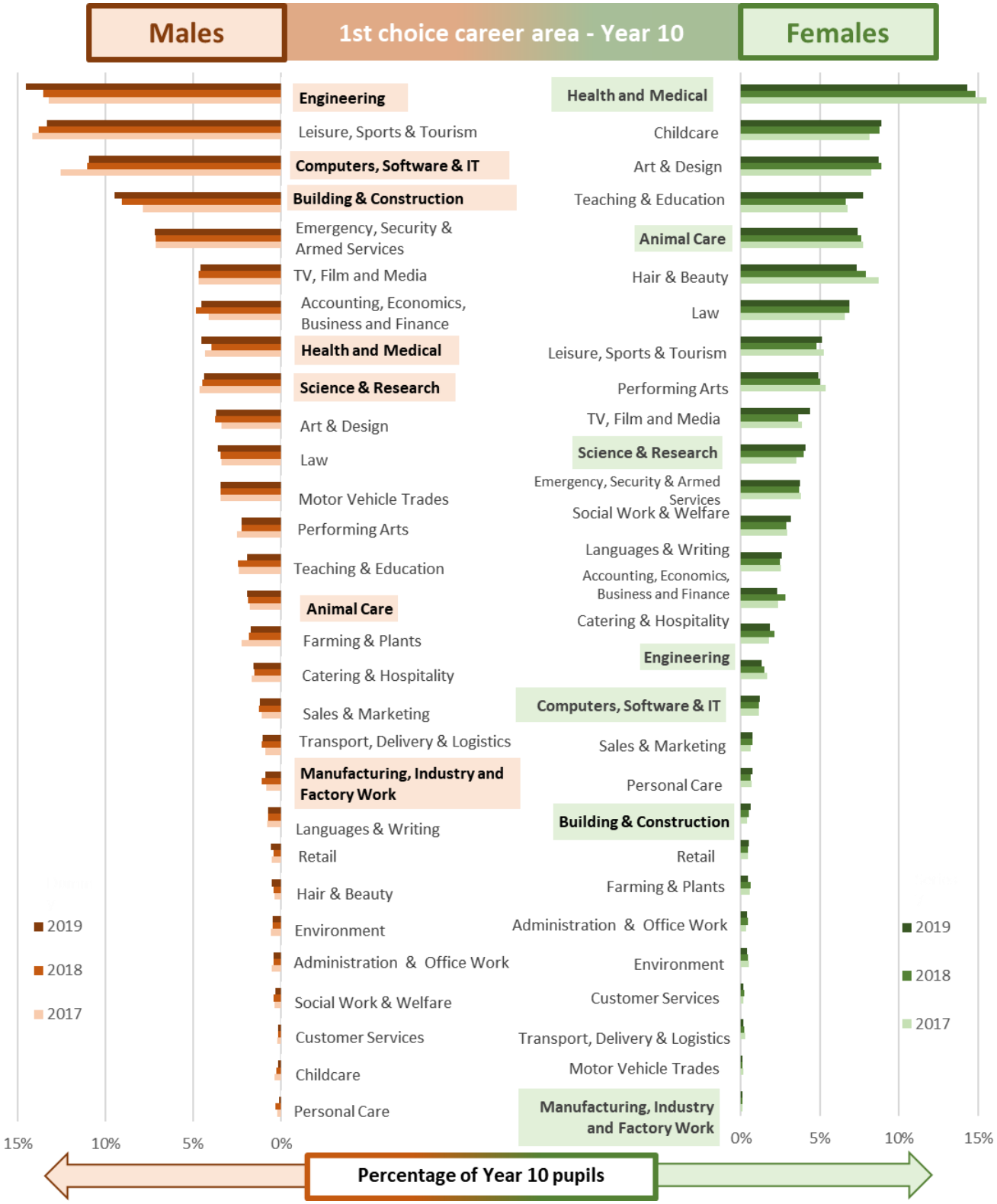
Table 12. Top five most popular first choice career areas among male and female Year 10 pupils 2017-2019*

Males			Females		
2017	2018	2019	2017	2018	2019
1. Leisure, Sports & Tourism	1. Leisure, Sports & Tourism	**1. Engineering**	**1. Health and Medical**	**1. Health and Medical**	**1. Health and Medical**
2. Engineering	**2. Engineering**	2. Leisure, Sports & Tourism	2. Hair & Beauty	2. Art & Design	2. Childcare
3. Computers, Software & IT	**3. Computers, Software & IT**	**3. Computers, Software & IT**	3. Art & Design	3. Childcare	3. Art & Design
4. Building & Construction	**4. Building & Construction**	**4. Building & Construction**	4. Childcare	4. Hair & Beauty	4. Teaching & Education
5. Emergency, Security & Armed Services	5. Emergency, Security & Armed Services	5. Emergency, Security & Armed Services	**5. Animal Care**	**5. Animal Care**	**5. Animal Care**

*Responses are typically received from around 80 per cent of all pupils. Data can be gathered at different points (Year 9, 10 or 11) which may influence pupils' responses. Data are gathered in different situations (e.g. most in facilitated group sessions, some individually).
Source: Careers Wales

Figure 14 presents the data for all career area choices over the most recent three years (2017-19). It shows that male Year 10 pupils tend to be more likely than females to select STEM-related career areas as their first choice. In 2019, five out of the 10 most popular career choices among male pupils were STEM-related, compared with two out of the top 10 choices of female pupils.

Figure 14. First choice career areas of Year 10 pupils in schools 2017-2019



Source: Careers Wales

Key findings: Learners in compulsory education

Primary

- Girls consistently out-perform boys in **primary Mathematics and Science assessments** during the Foundation Phase (Maths only) and Key Stage 2.

Secondary

Key Stage 3

- The gap between the percentage of girls and boys achieving the expected level (Level 5+) at **Key Stage 3** has increased over the past 20 years:
  - Maths from 2.5 to 4.2 percentage points.
  - Science from 1.9 to 4.8 percentage points.

GCSE entries

- **GCSE entries** in STEM academic subjects have increased among girls and boys. More girls than boys now enter GCSE **Biology**, **Physics** and **Chemistry**;

GCSE Attainment

- A higher percentage of girls than boys achieve a **GCSE A/A*** or an **A*-C grade** in most STEM subjects.
  - However, in 2018/19 the percentage of boys achieving **A*** in **Physics** GCSE was 5.7% higher than girls.
  - Far fewer girls than boys enter **GCSE in ICT and DT**, despite a higher percentage of girls achieving A*-C grades.
  - The number of girls entering **GCSE ICT** has halved in last 10 years. The number of boys entering ICT has remained static.

Career Aspirations

- Higher percentages of Year 10 females aspire to some STEM-related career areas notably **Health and Medical** and **Animal Care.**

- A higher percentage of males tend to aspire to some STEM-related career areas notably **Engineering**, **Computers**, **Software and IT** and **Building and Construction**.

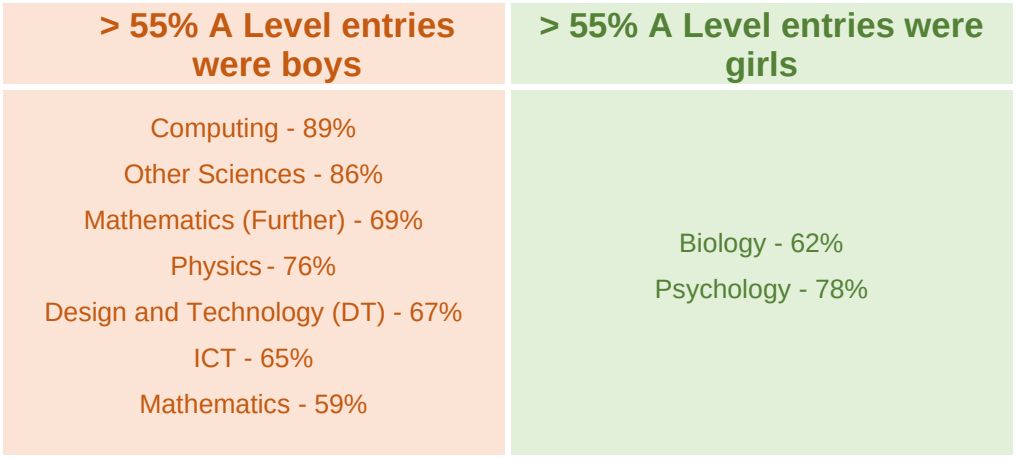
3. Learners in post-16 education

Data on learners' participation and attainment in post-16 education is set out in this section. This includes data on A Level entries and results and participation in Further Education (FE), Work-based learning (WBL), Adult Learning (AL) and Higher Education (HE).

3.1 A Level entries

The Joint Council for Qualifications publishes data on the number of A Level entries by gender. Across all A Level subjects, 57 per cent of entries in Wales were from girls in 2018/19. A fairly balanced split of boys and girls entered A Level Chemistry (48 per cent boys, 52 per cent girls). However, there was a notable gender imbalance in all other STEM subjects in 2018/19, most notably Computing (89 per cent boys) and Other Sciences (86 per cent). A Level subjects where more than 55 per cent of entries in 2018/19 were from boys or girls are shown in Figure 15.

Figure 15. A Level STEM subjects where more than 55 per cent of entries in 2018/19 were from boys or girls



Source: Joint Council for Qualifications: Provisional GCE A Level and GCE AS Level Results Summer 2019

Table 13 shows the number of boys and girls entering individual A Level STEM subjects in 2018/19 as well as the percentage share of these.[9]

[9] Psychology is shown separately in this table as the data are published by the JQC. However, Psychology A Level entry data is not published separately by Welsh Government and the subject is therefore included in Social Sciences.

Table 13. Number and percentage share of A Level entries 2018/19 by gender

Subject	Number of entries		Percentage share of all entries	
	Boys	Girls	Boys	Girls
Biology	1007	1628	38%	62%
Chemistry	1107	1223	48%	52%
Computing	329	40	89%	11%
Design and Technology	422	207	67%	33%
ICT	315	170	65%	35%
Mathematics	2102	1483	59%	41%
Mathematics (Further)	378	172	69%	31%
Physics	1229	386	76%	24%
Psychology	402	1440	22%	78%
Other Sciences	162	27	86%	14%
All subjects	**13639**	**17844**	**43%**	**57%**

Source: Joint Council for Qualifications: Provisional GCE A Level and GCE AS Level Results Summer 2019

The Welsh Government publishes data on A Level entries from schools by subject and gender over the period 2008/09 to 2018/19, enabling more detailed trend analysis to be undertaken. The data show that the overall number of A Level entries from schools in Wales across all subjects fell by over a third between 2008/09 and 2018/19. Some individual STEM subjects fell by more than the average: the number of girls entering ICT A Level examinations fell by 78.2 per cent (59.2 among boys) while the number entering Design and Technology fell by 51.2 per cent (33.7 per cent among boys).[10]

Figure 16 shows that in some STEM subjects, the percentage change in the number of A Level entries from schools was notably different between boys and girls. The number of entries for A Level Physics from girls increased by 6.8 per cent between 2008/09 and 2018/19 in contrast to the number of entries from boys, which fell by 15.5 per cent over the same period. The full dataset is included in Table 14 and Table 15.

Figure 16. STEM subjects where changes in the number of GCSE entries were notably different among girls and boys 2008/09 to 2018/19*

Percentage increase in entries was notably higher among girls	Percentage increase in entries was notably higher among boys
Physics	None
Percentage decrease in entries was notably lower among girls	**Percentage decrease in entries was notably lower among boys**
Biology Chemistry Other Sciences	DT ICT

*Notably different defined as a difference of over ten percentage points between boys and girls.
Source: Welsh Examinations Database, Welsh Government (via Awarding Organisations and a contracted collection body) and Pupil Level Annual School Census (PLASC), Welsh Government

[10] Design and Technology is referred to as Craft, Design and Technology in Welsh Government statistics.

Table 14. Percentage change in number of entries for individual STEM A Level subjects by gender 2008/09 - 2018/19

Subject	Percentage change 2008/09 – 2018/19	
	Boys	Girls
Biology	-27.0%	-8.7%
Chemistry	-25.5%	-2.1%
Physics	-15.5%	6.8%
Other Sciences	-59.4%	-42.9%
DT	-33.7%	-51.2%
ICT	-59.2%	-78.2%
Mathematics	-13.2%	-13.6%
All subjects	**-37.6%**	**-32.9%**

Green and **Orange** text denotes subjects where the percentage increase/decrease was over 10 percentage points higher/lower among **girls** or **boys**.

Note: Some subjects not published individually by Welsh Government. Computing is included within ICT, Mathematics (Further) included within Mathematics.

Source: Welsh Examinations Database, Welsh Government (via Awarding Organisations and a contracted collection body) and Pupil Level Annual School Census (PLASC), Welsh Government.

Table 15. Number of entries from schools in A level subjects 2008/09 - 2018/19

Subject	Number of entries													
	2012/13		2013/14		2014/15		2015/16		2016/17		2017/18		2018/19	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Biological Sciences	43%	57%	43%	57%	40%	60%	39%	61%	40%	60%	39%	61%	38%	62%
Chemistry	54%	46%	55%	45%	54%	46%	53%	47%	54%	46%	51%	49%	47%	53%
Physics	82%	18%	80%	20%	79%	21%	79%	21%	81%	19%	78%	22%	76%	24%
Other Sciences	85%	15%	84%	16%	82%	18%	82%	18%	84%	16%	92%	8%	85%	15%
Design & Technology*	64%	36%	65%	35%	63%	37%	59%	41%	61%	39%	62%	38%	66%	34%
ICT	60%	40%	66%	34%	70%	30%	64%	36%	73%	27%	73%	27%	73%	27%
Mathematics	60%	40%	61%	39%	62%	38%	60%	40%	62%	38%	61%	39%	60%	40%
All subjects	**43%**	**57%**	**44%**	**56%**	**43%**	**57%**	**42%**	**58%**	**43%**	**57%**	**43%**	**57%**	**42%**	**58%**

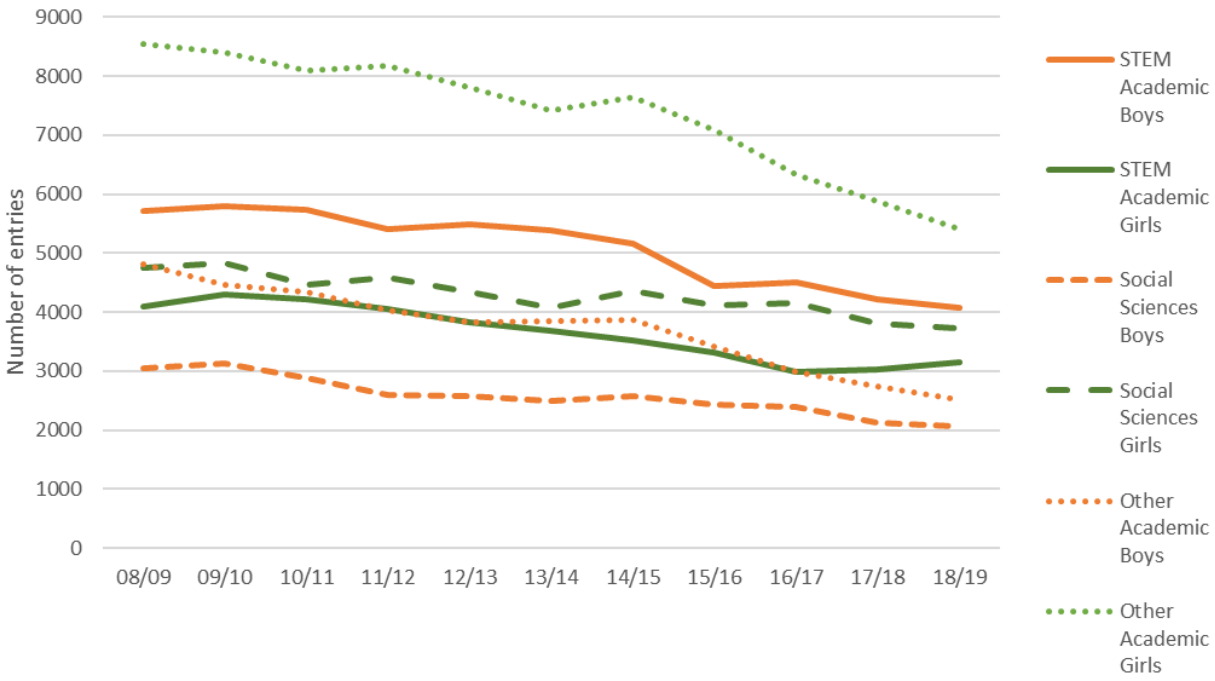
*Design and Technology is referred to as Craft, Design and Technology in Welsh Government statistics
Data for years prior to 2012/13 not shown for presentational reasons.
Note: Home Economics not shown as numbers are too small to be meaningful.
Source: Welsh Examinations Database, Welsh Government (via Awarding Organisations and a contracted collection body) and Pupil Level Annual School Census (PLASC), Welsh Government.

The data below analyses the total numbers of A Level examination entries and results for three groups of subjects by gender, as defined by the authors of this report in Table 6 (See Section 2.4). In each of the following groups, the number of entries for each individual subject have been aggregated to calculate the total number of entries within:

- STEM academic subjects;
- Social Sciences subjects;
- Other academic subjects;

Figure 17 shows that the number of A Level entries from schools for STEM academic subjects fell by around a quarter (23.0 per cent among girls and 28.6 per cent among boys).[11] The percentage decline in the number of entries in STEM subjects is therefore not as great as the decline across all subjects. The number of entries for STEM vocational subjects fell by 53.3 per cent among boys and 74.1 per cent among girls, while the number of entries in Social Sciences subjects fell by 21.5 per cent among girls and 32.3 per cent among boys [12]

Figure 17. Number of entries from schools in A level subjects 2008/09 - 2018/19



Source: Welsh Examinations Database, Welsh Government (via Awarding Organisations and a contracted collection body) and Pupil Level Annual School Census (PLASC), Welsh Government

Although the percentage decline in the number of entries in STEM subjects is not as great as the decline across all subjects, Table 14 above shows that some individual STEM subjects fell by more than the average: the number of girls entering ICT A Level

[11] STEM academic subjects defined in Section 2.4 as Biological Sciences, Chemistry, DT (Design & Technology), Home Economics, ICT, Mathematics, Other Sciences and Physics,
[12] STEM vocational subjects defined in Section 2.4 as Applied Business (VQ), Applied Engineering (VQ), Applied ICT (VQ), Applied Science (VQ). Social Sciences defined in Section 2.4 as Business Studies, Economics, Geography and Social Studies.

examinations fell by 78.2 per cent (59.2 among boys) while the number entering Design and Technology fell by 51.2 per cent (33.7 per cent among boys).[13]

3.2 A-Level results

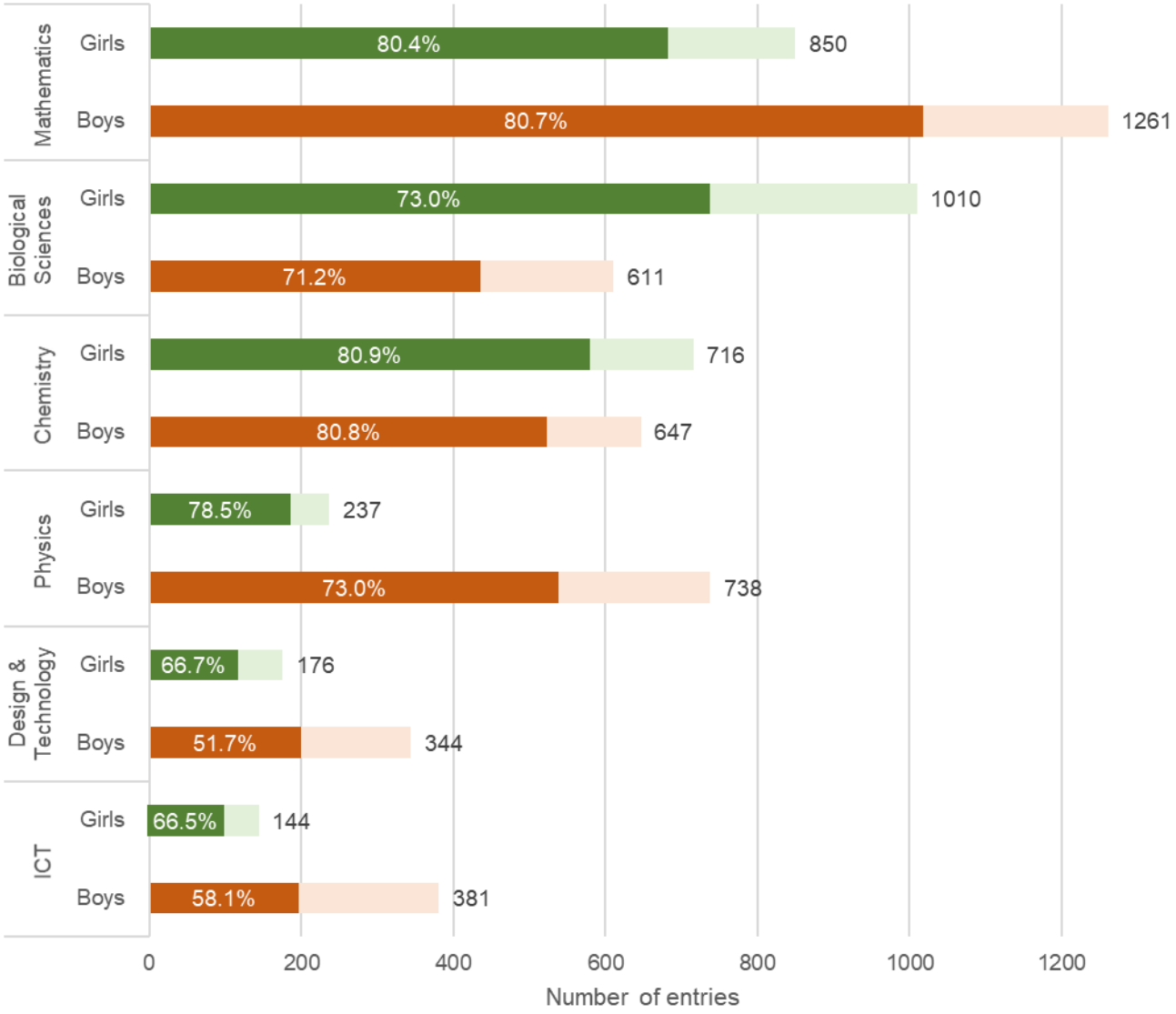
Across all subjects, a higher percentage of girls than boys achieve an A*-C grade at A Level, with a gap of at least 5 percentage points in each year from 2010/11 to 2018/19. Figure 18 shows the numbers entering A level examinations in STEM academic subjects in 2018/19 as well as the percentage achieving A*-C grades in each subject. The data show that the gap between the percentage of girls and boys achieving an A*-C grade in 2018/19 was fairly narrow in Mathematics, Chemistry and Biological Sciences, although significantly more boys than girls entered Mathematics and significantly more girls than boys entered Biological Sciences A levels.

Girls significantly outperformed boys in terms of the percentage achieving A*-C grades in Physics (girls over five percentage points higher), Design and Technology (15 percentage points higher) and ICT (over eight percentage points higher). However, significantly fewer girls than boys entered A levels in each of these subjects:

- Physics – 237 girls, 738 boys;
- ICT – 144 girls, 381 boys;
- DT – 176 girls, 344 boys.

[13] Design and Technology is referred to as Craft, Design and Technology in Welsh Government statistics.

Figure 18. Number of A level entries from schools and corresponding percentage achieving an A*-C grade 2018/19



Source: Welsh Examinations Database, Welsh Government (via Awarding Organisations and a contracted collection body) and Pupil Level Annual School Census (PLASC), Welsh Government.

Table 16 shows the percentage of girls and boys achieving individual A level grades in 2018/19. It shows that a higher percentage of girls than boys achieve A* and A grades in Physics and DT, while a higher percentage of boys than girls achieve A* and A grades in Chemistry. A higher percentage of boys achieved A* grades in Mathematics and ICT, with girls more likely to attain A, B and C grades in these subjects.

Table 16. Percentage of pupils achieving each grade in A level STEM academic subjects 2018/19

Subject / Boys (B) and Girls (G)	Percentage of entries achieving each grade																Number of entries	
	A*		A		B		C		D		E		Ungraded		A*-C			
	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G
Biological Sciences	8.8	11.6	20.1	17.7	20.8	23.2	21.4	20.5	16.2	15	11.5	10.9	1.1	1.2	71.2	73	611	1010
Chemistry	10	9.4	24.4	22.6	24.7	27.4	21.6	21.5	13.8	14	4.9	5	-	-	80.8	80.9	647	716
Physics	11.2	12.2	16.9	19.8	23.3	24.9	21.5	21.5	14.5	14.8	10.8	6.8	1.6	0	73	78.5	738	237
Other Sciences	8.8	6.3	3.3	31.3	16.5	12.5	27.5	6.3	19.8	25	16.5	18.8	7.7	0	56	56.3	91	16
DT	2.9	5.1	7	18.8	22.4	19.9	25.9	22.7	25	22.7	15.7	10.2	1.2	0.6	58.1	66.5	344	176
ICT	3.1	2.1	8.4	10.4	15.2	17.4	24.9	36.8	32.5	23.6	13.6	9	2.1	0.7	51.7	66.7	381	144
Mathematics	22.8	18.5	25.5	26.6	18.9	19.2	13.5	16.1	10.6	11.6	7.9	6.9	0.9	1.1	80.7	80.4	1261	850
All subjects	**8.5**	**8.4**	**16.1**	**17.8**	**23.9**	**28**	**24.6**	**25.2**	**17.3**	**14.6**	**8.5**	**5.6**	**1.0**	**-**	**73.1**	**79.4**	**8278**	**11309**

Green text denotes subjects where girls outperform boys by at least one percentage point in terms of the percentage obtaining grades A*, A, B or C.
Orange text denotes subjects where boys outperform girls by at least one percentage point in terms of the percentage obtaining grades A*, A, B or C.
*Can include GCSE subjects such as Design & Technology, D&T Textiles Technology, D&T Food Technology, D&T Electronic Products, D&T Graphic Products, D&T Resistant Materials, D&T Systems & Control, D&T Engineering, D&T Product Design and/or Motor Vehicle Studies
Source: Welsh Examinations Database, Welsh Government (via Awarding Organisations and a contracted collection body) and Pupil Level Annual School Census (PLASC), Welsh Government

3.2.1 Comparing A level entries with other UK nations

When examining gender balance in the percentage of entries within STEM academic subjects, Table 17 shows that there are similar patterns to Wales across England, Scotland and Northern Ireland, with:

- a notably higher share of entries from girls in:
  - Biology across all four UK nations;
  - Psychology in Wales, England and Northern Ireland;
- a notably higher share of entries from boys in:
  - Computing, Design and Technology, Mathematics and Physics across all four UK nations;
  - ICT, Mathematics (Further), Other Sciences in Wales, England and Northern Ireland;
- a more even share of entries in Chemistry from boys and girls across all four UK nations.

Table 17. Percentage share of STEM A Level or Advanced Higher qualification subject entries by gender and UK nation

Subject	Wales		England		Northern Ireland		Scotland		UK	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Biology	38%	62%	37%	63%	35%	65%	29%	71%	37%	63%
Chemistry	48%	52%	46%	54%	44%	56%	44%	56%	46%	54%
Computing	89%	11%	87%	13%	81%	19%	86%	14%	87%	13%
Design and Technology	67%	33%	68%	32%	71%	29%	59%	41%	68%	32%
ICT	65%	35%	75%	25%	62%	38%	-	-	64%	36%
Mathematics	59%	41%	61%	39%	57%	43%	59%	41%	61%	39%
Mathematics (Further)	69%	31%	72%	28%	70%	30%	-	-	71%	29%
Physics	76%	24%	78%	22%	73%	27%	77%	23%	77%	23%
Psychology	22%	78%	26%	74%	19%	81%	-	-	26%	74%
Other Sciences	86%	14%	77%	23%	46%	54%	-	-	70%	30%
All subjects	43%	57%	45%	55%	44%	56%	44%	56%	45%	55%

Green text denotes that more than 55% of entries were from girls.
Orange text denotes that more than 55% of entries were from boys.
Note: Computing and ICT includes Computer Science, Computing Science, Computing or ICT. DT includes DT, Design and Technology or Design and Manufacture. Engineering includes Engineering Science in Scotland.
Source: Joint Council for Qualifications: Provisional GCE A Level & GCE AS Level Results Summer 2019; Scottish Qualifications Authority – Attainment Statistics (August) 2019

Table 18 shows A Level (Wales, England and Northern Ireland) and Advanced Higher (Scotland) attainment data for STEM subjects by UK nation. It shows the percentage of girls and boys entered who attain grades A or above and grade C or above in individual STEM subjects.

The data show that:

- Girls outperform boys in most subjects across all four nations in terms of the percentage achieving grade A or above and C or above in STEM subjects.
    - Girls outperform boys on both measures (A or above and C or above) in **DT**, **Biology** and **Psychology** in all four nations;
    - Girls outperform boys on both measures in **ICT** in Wales, Northern Ireland and Scotland, and on the A*-C measure in England;
    - In Wales and England, a higher percentage of girls than boys obtain A-A* grades in **Chemistry** and **Mathematics**, but the A*-C measures in both subjects are more even by gender;
- Girls outperform boys on both measures in **Physics** in Wales and Scotland, but not elsewhere;
    - Boys outperform girls on both measures in Northern Ireland, and a more even picture is apparent in England;
- Girls outperform boys in **Other Sciences** in Wales, but the data shows a more even picture in England and Northern Ireland;
- A more even picture is apparent in **Computing** in Wales, England and Northern Ireland with fairly small differences in attainment by gender.
    - However, girls outperform boys by a notable margin in Scotland.

Table 18. Percentage of girls and boys attaining grades A or above and C or above in A Level and Advanced Higher examinations by subject and UK nation

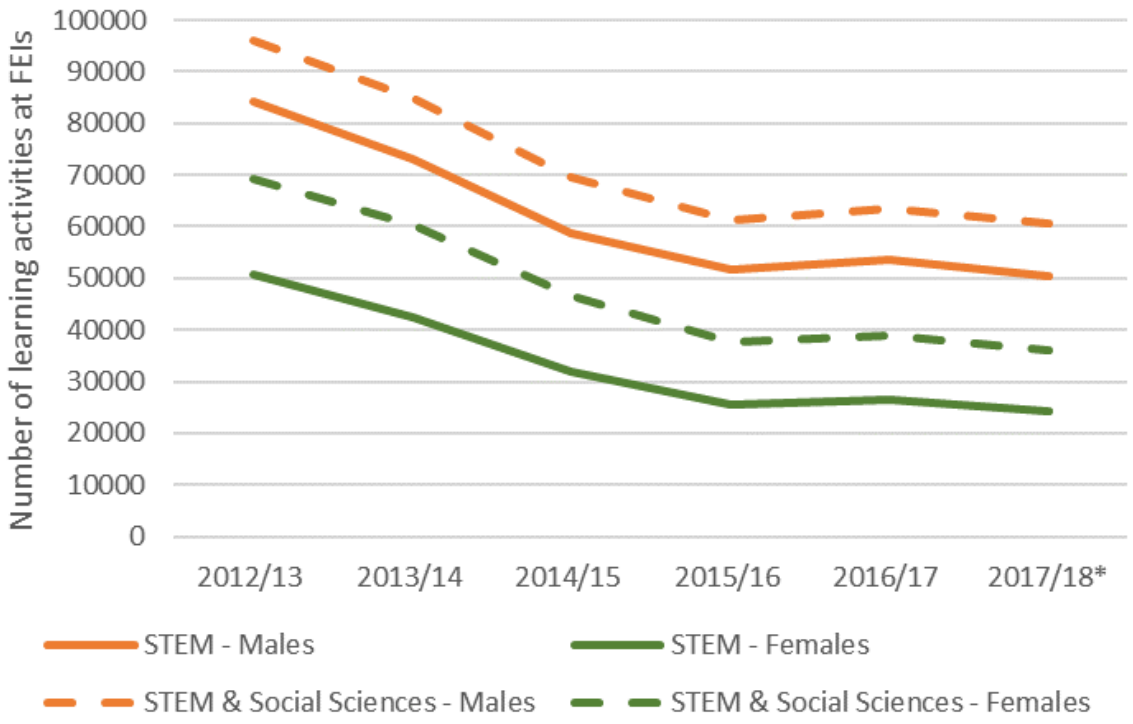
Subject or grouping / Boys (B) Girls (G)	Percentage of A Level / Advanced Higher entries achieving each grade or above by UK nation																			
	Wales				England				Scotland				Northern Ireland				UK			
	Grade A*/A		Grade A*-C		Grade A*/A		Grade A*-C		Grade A		Grade A-C		Grade A*/A		Grade A*-C		Grade A*/A		Grade A*-C	
	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G
Computing	18.5	15	58.7	62.5	17.4	18.7	62.9	62.7	23.2	29.2	64	74.2	27.9	23.7	82.9	74.6	17.8	18.7	63.4	63.1
ICT	6.7	10.6	47	67.6	7	0	65.1	71.4	-	-	-	-	14.9	26.9	70.6	75.9	12	21.4	62.9	73.4
DT	10.2	26.1	58.3	69.1	14	19.8	64.8	73.2	6.4	9.4	59.6	71.9	18.4	27.8	78.1	84.9	14.2	20.7	65.6	73.9
Other Sciences	11.7	25.9	54.9	59.3	27.5	26	72.1	73.2	-	-	-	-	13	10.3	66.9	65.5	23.8	19.4	69.8	69.6
Biology	30.8	30.2	72.7	73.5	21.9	24.4	64.5	67.4	21.2	26.0	72.2	74.9	34.5	34.5	83.5	85.3	22.7	25	65.5	68.3
Physics	30.5	36.3	73.1	78	27.3	28.1	69.8	70.9	29.0	39.9	76.7	84.7	35.5	37.8	81.2	78.8	27.6	28.7	70.2	71.4
Chemistry	36.9	33.3	80.1	80.7	30.1	27	71.5	71.3	33.1	34.3	82.6	81.9	44.8	44.1	86.7	87.6	30.7	27.7	72.3	72.1
Mathematics	45.8	44.4	76	77.3	41.8	38.5	75	75.1	36.3	38.6	73.9	77.5	49.2	48.2	88.2	90	42.1	39.1	75.5	75.7
Mathematics (Further)	62.2	57.6	90.2	90.7	54.1	50.5	86.3	86.4	-	-	-	-	62.8	68.6	96.7	100	54.5	51	86.6	86.6
Psychology	14.2	21.8	70.4	79.2	10	18.7	60.7	74.2	-	-	-	-	10.4	16.5	59.4	73.3	10.1	18.8	60.9	74.4
All subjects	**26.5**	**27.4**	**73.2**	**78.7**	**25.2**	**25.1**	**73.3**	**77.2**	**31.5**	**32.0**	**76.8**	**81.4**	**29.1**	**32.3**	**83.1**	**86.1**	**25.4**	**25.5**	**73.7**	**77.6**

Green text denotes subjects where girls outperform boys by at least one percentage point in terms of the percentage obtaining grades A/7 and C/4 or above.
Orange text denotes subjects where boys outperform girls by at least one percentage point in terms of the percentage obtaining grades A/7 and C/4 or above.
Note: Computing and ICT includes Computer Science, Computing Science, Computing or ICT. DT includes CDT (Welsh Government data), Design and Technology or Design and Manufacture.
Source: Joint Council for Qualifications: Provisional GCE A Level and GCE AS Level Results Summer 2019; Scottish Qualifications Authority – Attainment Statistics (August) 2019

3.3 Further education

The Welsh Government collects data on learning activities at further education institutions (FEIs) by subject and gender. The data in Figure 19 show that the overall number of learning activities across all subject areas and learners fell by 42 per cent between 2012/13 and 2017/18. The number of learning activities in STEM subjects at FEIs fell by over half (52 per cent) among females, and by 40 per cent among males between 2012/13 and 2017/18.[14] If Social Sciences are grouped with STEM subjects in the analysis, the number of learning activities by females fell by 48 per cent, and males by 37 per cent over the same time period.[15]

Figure 19. Learning activities at further education institutions by subject and gender



(2) Data from 2017/18 onwards is not comparable with data up to 2016/17 die to changes in collection methods. *From 1 August 2017 Information relating to learning activities not funded by the Welsh Government, and Welsh for Adults provision in Further Education institutions is no longer collected through the LLWR.
Source: Lifelong Learning Wales Record (LLWR)

[14] STEM subjects defined as Medicine and Dentistry; Nursing and Subjects and Vocations Allied to Medicine; Science; Mathematics and Statistics; Agriculture; Horticulture and Forestry; Animal Care and Veterinary Science; Environmental Conservation; Other (Agriculture, Horticulture and Animal Care); Engineering; Manufacturing Technologies; Transportation Operations and Maintenance; Other (Engineering and Manufacturing Technologies); Architecture; Building and Construction; Other (Construction, Planning and the Built Environment); ICT Practitioners; ICT for Users; Other (Information and Communication Technology). Archaeology and Archaeological Sciences; Accounting and Finance.
[15] Social Sciences are defined as History; Philosophy; Geography; Sociology and Social Policy; Politics; Economics; Other (Social Sciences); Administration and Business Management.

3.3.1 Comparing FE enrolments with other UK nations

Allowing for some slight differences in the definitions of STEM courses across UK nations, comparisons of the gender balance of enrolments can be made by examining the proportion of enrolments from each nation that are from males and females.

In Wales, Welsh Government data for 2017/18 show that:

- two-thirds (67.6 per cent) of all enrolments on STEM FE courses were from males, with (32.4 per cent) from females;
- the proportion of enrolments on STEM courses that are from females has fallen from 37.6 per cent in 2012/13 to 32.4 per cent in 2017/18.
- slightly more than half of enrolments on Social Sciences were from females (53.5 per cent) with a little under half from males (46.5 per cent).

In Scotland, data on enrolments by subject and gender are published by the Scottish Funding Council. The latest data for 2017/18 show that:

- over half (57.0 per cent) of enrolments on STEM courses were from males, with 42.8 per cent from females.[16]
- the proportion of enrolments on STEM FE courses that were from females remained fairly constant between 2012/13 (42.1 per cent) and 2017/18;
- over half of enrolments on Social Sciences courses (60.1 per cent) were from females, with 39.7 per cent from males.

In Northern Ireland, data on enrolments by subject area are published by the Department for Education.[17] The latest data for 2017/18 show that:

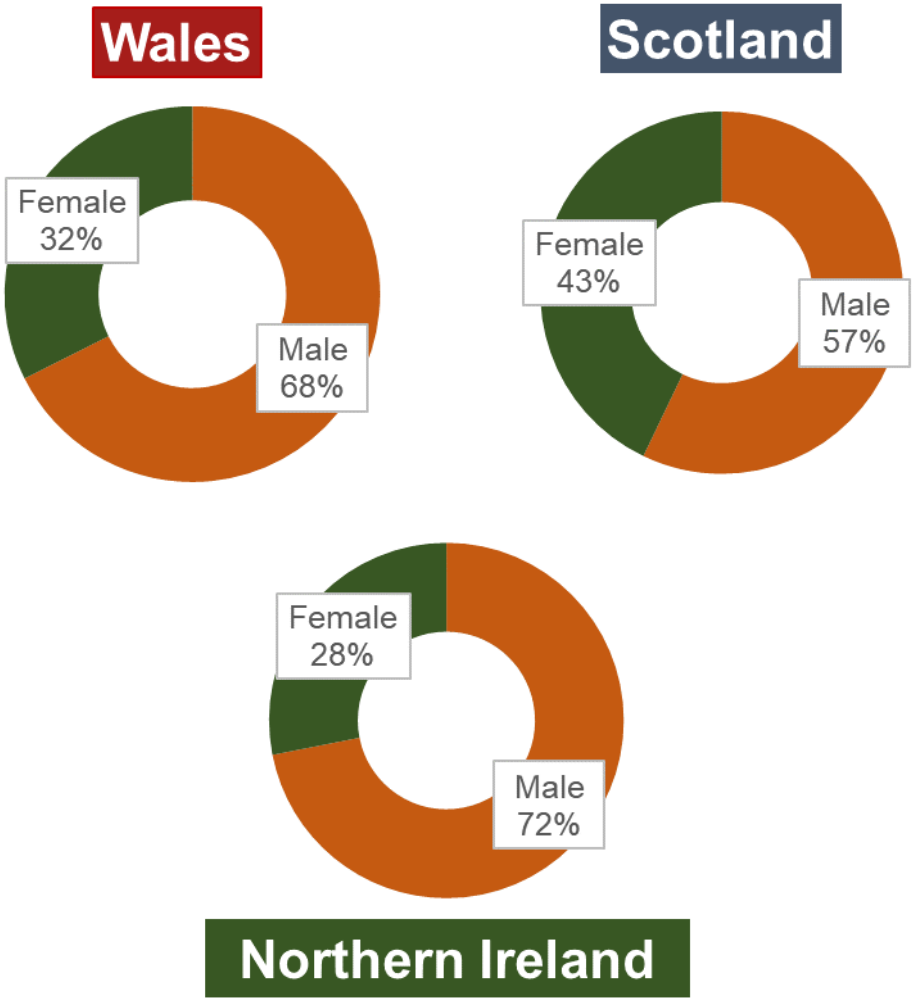
- over two-thirds of enrolments on 'broad' STEM subjects (71.9 per cent) were from males, with just over a quarter (28.1 per cent) from females;
- the proportion of students enrolling on STEM subject courses who are female has fallen from 32 per cent to 28 per cent between 2013/14 and 2017/18.

Figure 20 shows the percentage share of enrolments by males and females on STEM courses in FE colleges in Wales, Scotland and Northern Ireland in 2017/18. Data on enrolments by subject and gender is not routinely published by the Department of Education in England.

[16] Data from the SFC's Infact database. STEM definition derived by authors to include: Information Technology and Information; Health Care / Medicine /Health and Safety; Environment Protection/ Energy/Cleansing/Security; Sciences and Mathematics; Agriculture, Horticulture and Animal Care; Construction and Property (Built Environment); Manufacturing / Production Work; Engineering; Oil / Mining / Plastics / Chemicals;
Transport Services.

[17] The Department for Education in Northern Ireland use a 'broad' and 'narrow' STEM subject classification for FE statistics: "STEM provision is identified by the subject code entered by the FE college. If the subject code starts with a letter between A and K (Medicine, Dentistry and Allied Subjects; Biological and Physical Sciences; Agriculture; Mathematics and IT; Engineering and Technology; Architecture, Building and Planning) then it is regarded as 'Broad' STEM. 'Narrow' STEM is those enrolment records with a subject code starting with a letter C, F, G, H or J (Biological and Physical Sciences; Mathematics and IT; Engineering and Technology)."

Figure 20. Percentage share of enrolments on STEM courses in FE colleges by gender 2017/18



Sources: Lifelong Learning Wales Record, Welsh Government; Scottish Funding Council Infact database; Department for Education in Northern Ireland.

3.4 Work-based learning

The Welsh Government publishes data on the number of apprenticeship learning programmes started according to the type of apprenticeship programme, level of study and gender. Annual data are presented in **Figure 21** based on Level 2 (Foundation) and Level 3 apprenticeships, as well as higher apprenticeships (Level 4 and above). The definition of STEM apprenticeship programmes for the analysis below is based on individuals programme types selected by the authors.[18]

[18] These are: Agriculture; Animal Care; Equine; Horticulture; Veterinary Nursing; Other Sector Frameworks - Agriculture; Construction (Building - excluding Specialist); Construction (Specialist); Construction (Civil Engineering) – Apprenticeship; Construction (Civil Engineering) - Foundation Apprenticeship Direct Entry; Construction (Technical and Professional); Construction Management; Electrotechnical; Fencing; Heating and Ventilation; Housing; Plumbing and Heating; Refrigeration and Air Conditioning; Other Sector Frameworks - Construction (2); Transportation; Advanced

In 2017/18, just over half of enrolments on apprenticeships in STEM sector subject areas in Wales were from females (52.3 per cent), with just under half from males (47.4 per cent). Figure 21 below shows the number of Level 2, 3 and Higher apprenticeship learning programmes started in STEM subject areas by gender annually between 2012/13 to 2017/18. The data show that, over the period 2012/13 to 2017/18:

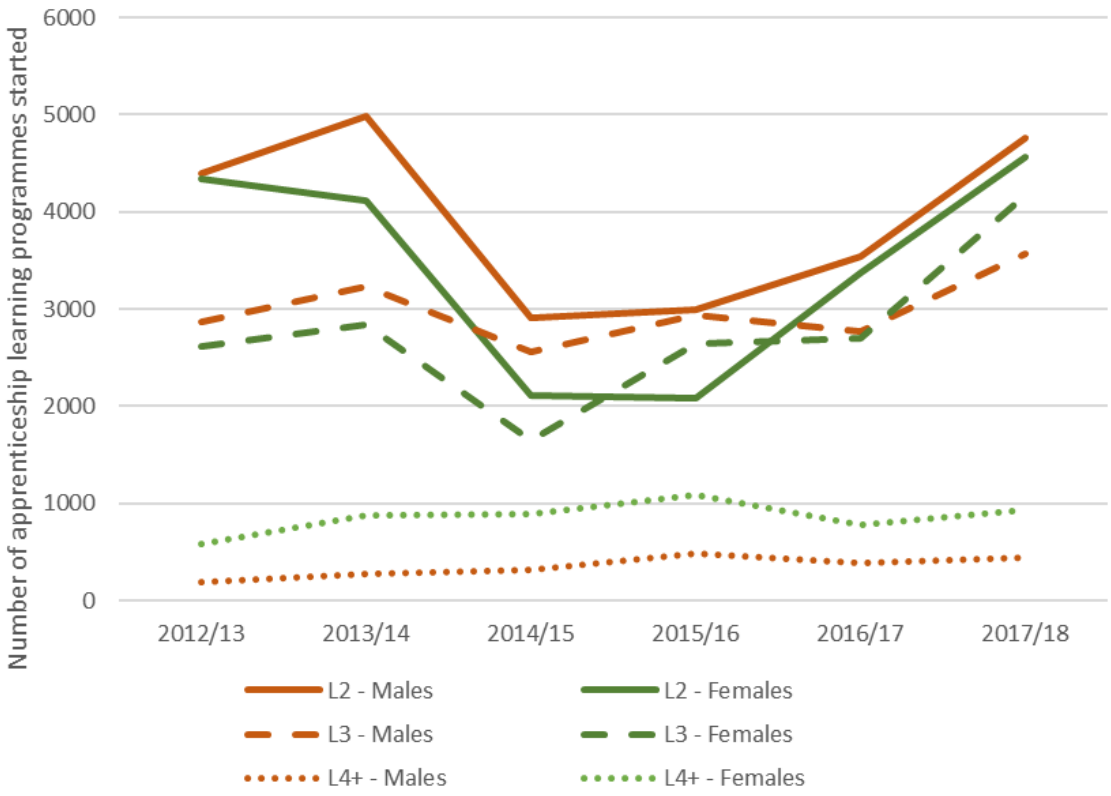
- The number of **Level 2 apprenticeship** programme starts in STEM subject areas has fluctuated, but declined overall by five per cent among females and by eight per cent among males.
    - This compares to a fall of 18 per cent among females and by nine per cent among males in the total number of Level 2 apprenticeship programme starts (across all programme types) over the same period.
    - By 2017/18, a similar number of males (4,765) and females (4,565) were undertaking Level 2 apprenticeship programmes in areas related to STEM.

- The number of **Level 3 apprenticeship** programme starts in STEM subject areas increased by almost 40 per cent, with an increase of 59 per cent among females and 24 per cent among males.
    - This compares to an increase of 25 per cent across all Level 3 programmes between 2012/13 and 2017/18.
    - By 2017/18, a higher number of Level 3 apprenticeships were started by females than males in programme types relating to STEM.

- Fewer **higher apprenticeships (Level 4 and above)** are undertaken overall (5,105 in 2017/18) compared with those at Levels 2 and 3.
    - However, the number started by females increased by 62 per cent between 2012/13 and 2017/18, with the number started by males increasing by 123 per cent over the same period.
        - Much of the growth in Higher Apprenticeships among males and females is driven by an increase in the number of learners starting a Professional Framework in Advanced Practice in Social Care.
    - Females account for around two-thirds of all higher apprenticeship programme starts in areas relating to STEM (930 out of 1,380 in 2017/18).

Engineering Construction; Engineering; Engineering Manufacture; Engineering Manufacture - Higher Apprenticeship; Extractives and Mineral Processing Operations; Improving Operational Performance (Engineering Direct Entry); Operations and Quality Improvement; Rail Engineering (Track); Vehicle Body and Paint Operations; Vehicle Fitting; Vehicle Maintenance and Repair; Vehicle Parts; Other Sector Frameworks - Engineering (2); Food and Drink; Improving Operational Performance; Other Sector Frameworks - Manufacturing (2); Accounting; IT Users; IT, Software, Web & Telecoms Professionals; Providing Financial Services; Data Analytics; Craft Cuisine; Hospitality and Catering; Health - Clinical Healthcare Support; Health - Dental Nursing; Health - Healthcare Support Services; Health - Pharmacy Services; Health and Social Care; Professional Framework in Advanced Practice in Social Care; Professional Framework in Leadership and Management in Social Care; Sustainable Resource Management; Other Sector Frameworks - Healthcare and Public Services (2); Creative and Digital Media; Social Media and Digital Marketing; Other Sector Frameworks - Media and Design (2).

Figure 21. Number of Level 2, 3 and Higher apprenticeship learning programmes started in STEM subject areas by gender 2012/13 to 2017/18



Source: Lifelong Learning Wales Record (LLWR)

3.4.1 Comparing apprenticeship data from Wales to other UK nations

Comparisons of apprenticeship data by subject area across UK nations should be treated with caution as there has been significant divergence between apprenticeship systems in recent years. Each UK nation has different apprenticeship systems and uses its own apprenticeship subjects, frameworks and routes. This means that groupings of 'STEM apprenticeships' differ for each nation. Below we describe the data on gender balance within apprenticeships defined as being within the STEM grouping in each UK nation.[19] However, drawing comparisons of performance between the nations should be avoided due to the differences described above.

Welsh Government data show that just over half of enrolments on apprenticeships in STEM sector subject areas in Wales were from females (52.3 per cent), with just under half from males (47.4 per cent). In non-STEM sector subject areas, just under three-quarters (72.9 per cent) of enrolments were from females, with just over a quarter (27.5 per cent) from males. The proportion of all enrolments on apprenticeships in STEM sector subject areas

[19] Data on apprenticeships by gender and route in England available here. Data on Modern Apprenticeships by framework and gender in Scotland available here. Data on apprenticeships by framework and gender in Northern Ireland available here.

that are from females has remained at around 50 per cent since 2012/13. In other UK nations, the most recent data show that:

- In England, 56.3 per cent of those who started apprenticeships in STEM subject areas in 2018/19 were male, with 43.7 per cent female.[20]
    - In other subject areas, the majority (57.0 per cent) were female, with 42.7 per cent male.
- In Scotland, 91.1 per cent of all Modern Apprenticeship starts in STEM subject areas were by males, with 8.9 per cent females in 2018/19.[21]
- In Northern Ireland, 96.7 per cent of participants on STEM apprenticeships in April 2019 were male, with just 3.3 per cent female; this compares to 42 per cent male and 57 per cent female in non-STEM apprenticeship frameworks.[22]

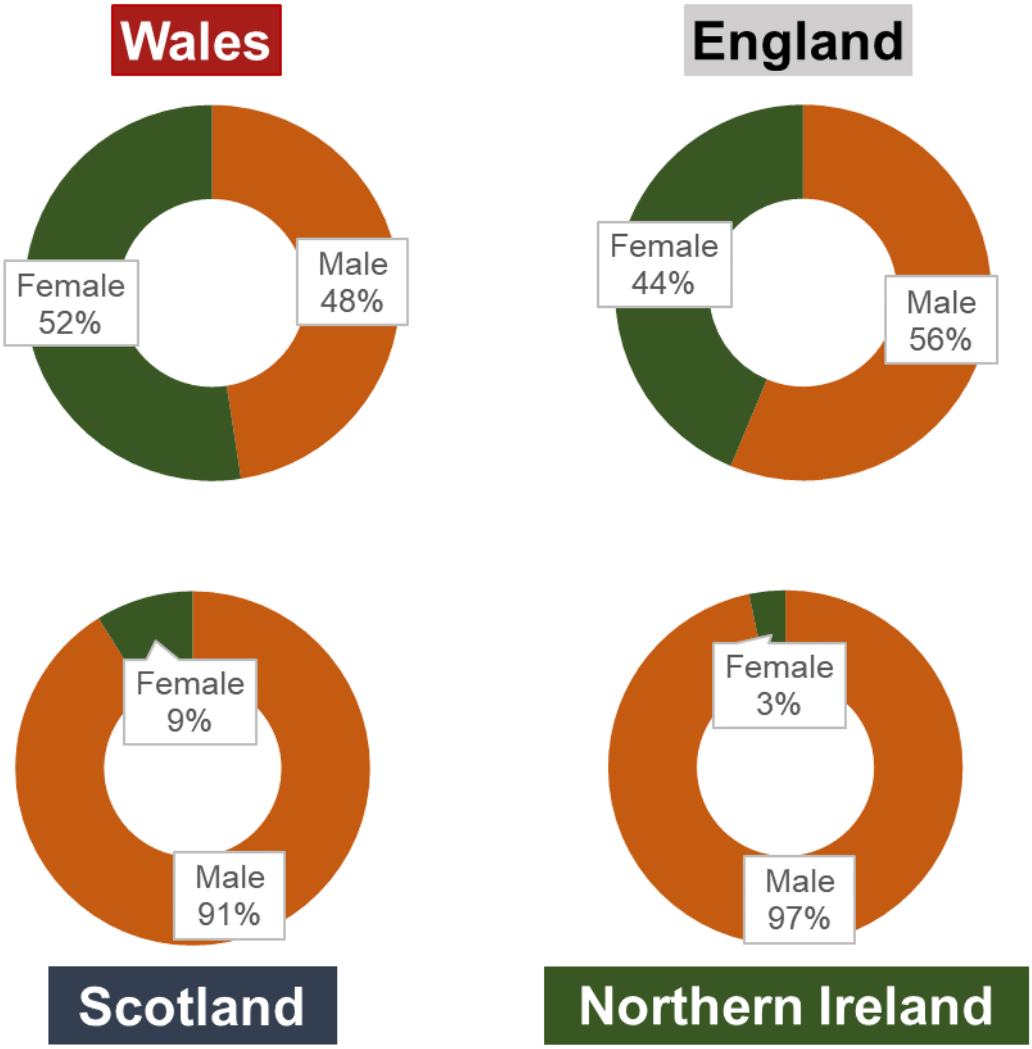
Figure 22 shows the percentage of male and female enrolments on apprenticeships in STEM-related subject areas by for the most recent year available in each UK nation.

[20] STEM subject areas defined by the authors of this report as including the following from DfE England statistics: Agriculture; Horticulture and Animal Care; Construction, Planning and the Built Environment; Engineering and Manufacturing Technologies; Health, Public Services and Care; Information and Communication Technology; Science and Mathematics.

[21] Skills Development Scotland and the Scottish Government agree a list of STEM Modern Apprenticeship frameworks annually. The list for 2018/19 includes the following subject areas: Agriculture, Aquaculture, Automotive, Biotechnology, Bus and Coach Engineering and Maintenance, Construction, Creative and Digital Media, Data Analytics Technical Apprenticeship, Dental Nursing, Digital Applications, Domestic Plumping & Heating, Electrical Installation, Electronic Security Systems, Electrotechnical Services, Engineering, Equine, Gas Heating & Energy Efficiency, Gas Industry, Heating, Ventilation, Air Conditioning and Refrigeration, Horticulture, Industrial applications, Information & Communication Technologies Professional, Information Security, IT and Telecommunications, Land-based engineering, Life Sciences, Life Science and Related Science Industries, Network Construction Operations, Oil and Gas Extraction, Pharmacy Services, Plumbing, Polymer Processing, Power Distribution, Process Manufacturing, Rail Engineering, Rail Transport Engineering, Trees and Timber, Upstream Oil and Gas Production, Water Industry, Water Treatment Management, Wind Turbine Installation and Commissioning, Wind Turbine Operations and Maintenance.

[22] STEM apprenticeship frameworks defined by the authors of this report from Department for the Economy NI data as: Accountancy, Agriculture, Amenity Horticulture, Animal Care, Aviation Operations on the Ground, Construction, Construction Crafts, Construction Technical, Creative and Digital Media, Dental Nursing, Driving Goods Vehicles, Electrical and Electronic Servicing, Electrical Distribution and Trans. Engineering, Electrical Power Engineering, Electrotechnical, Engineering, Equine Industry, Heating , Ventilation, Air Conditioning and Refrigeration, I.T. User, IT and Telecoms Professional, Land - based Service Engineering, Light Vehicle Body and Paint Operations, Mechanical Engineering Services (Plumbing), Pharmacy Services, Surveying, Vehicle Body and Paint, Vehicle Fitting, Vehicle Maintenance and Repair, Vehicle Parts, Vehicle Sales, Veterinary Nursing.

Figure 22. Percentage of male and female enrolments on apprenticeships in STEM-related subject areas* 2017-19**



*Data are based on different definitions of STEM and different apprenticeship systems in each nation.
**Wales data are based on starts during 2017/18. England and Scotland data based on starts in 2018/19. NI data based on participants in April 2019.
Sources: Lifelong Learning Wales Record (LLWR), Welsh Government; Department for Education, England. Skills Development Scotland and the Scottish Government; Apprenticeships NI statistics, Department for the Economy, Northern Ireland.

3.6 Higher Education

Data on the number of enrolments on HE courses is presented in this section.[23] Unless otherwise stated, all data in this section are based on where students study, rather than where they are domiciled.

3.6.1 Enrolments

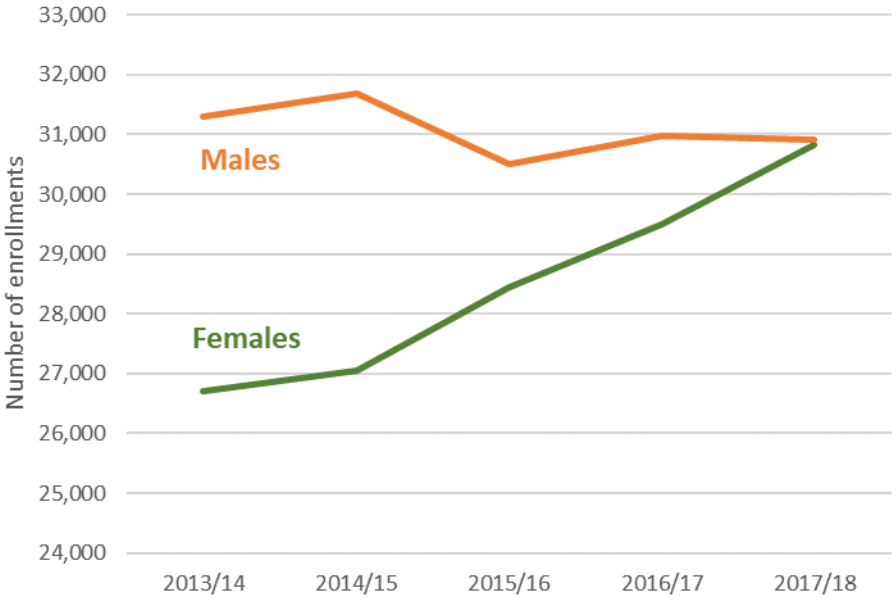
The Higher Education Statistics Agency (HESA) publishes data on the number of students enrolling on HE courses at providers in Wales by individual subject and gender. HESA groups the following subjects together under the category 'science subject areas'. In the remainder of this section, these are referred as 'STEM courses':

- Medicine & dentistry
- Subjects allied to medicine
- Biological sciences
- Agriculture & related subjects
- Physical sciences
- Mathematical sciences
- Computer science
- Engineering & technology
- Architecture, building & planning

The total number of enrolments on STEM courses at HEIs in Wales increased from 58,015 in 2013/14 to 61,785 in 2017/18. This represents an increase of 6.5 per cent over this period, in contrast to a fall of 5.5 per cent across all subject areas. The increase in enrolments on science subject area courses was driven by increases in the number of female enrolments. Figure 23 shows that the number of females enrolling on science subject area courses increased from 26,705 in 2013/14 to 30,825 in 2017/18; an increase of 15.4 per cent, compared with a fall of 1.2 per cent among males over the same period. By 2017/18, almost as many females (30,825) as males enrolled on science subject area HE courses (30,905).

[23] UCAS also collects data on the number of applications, unique applicants and acceptances for HE courses by subject group and gender. These data are collected on an ongoing basis, but are not published in the UCAS end of cycle applicant figures.

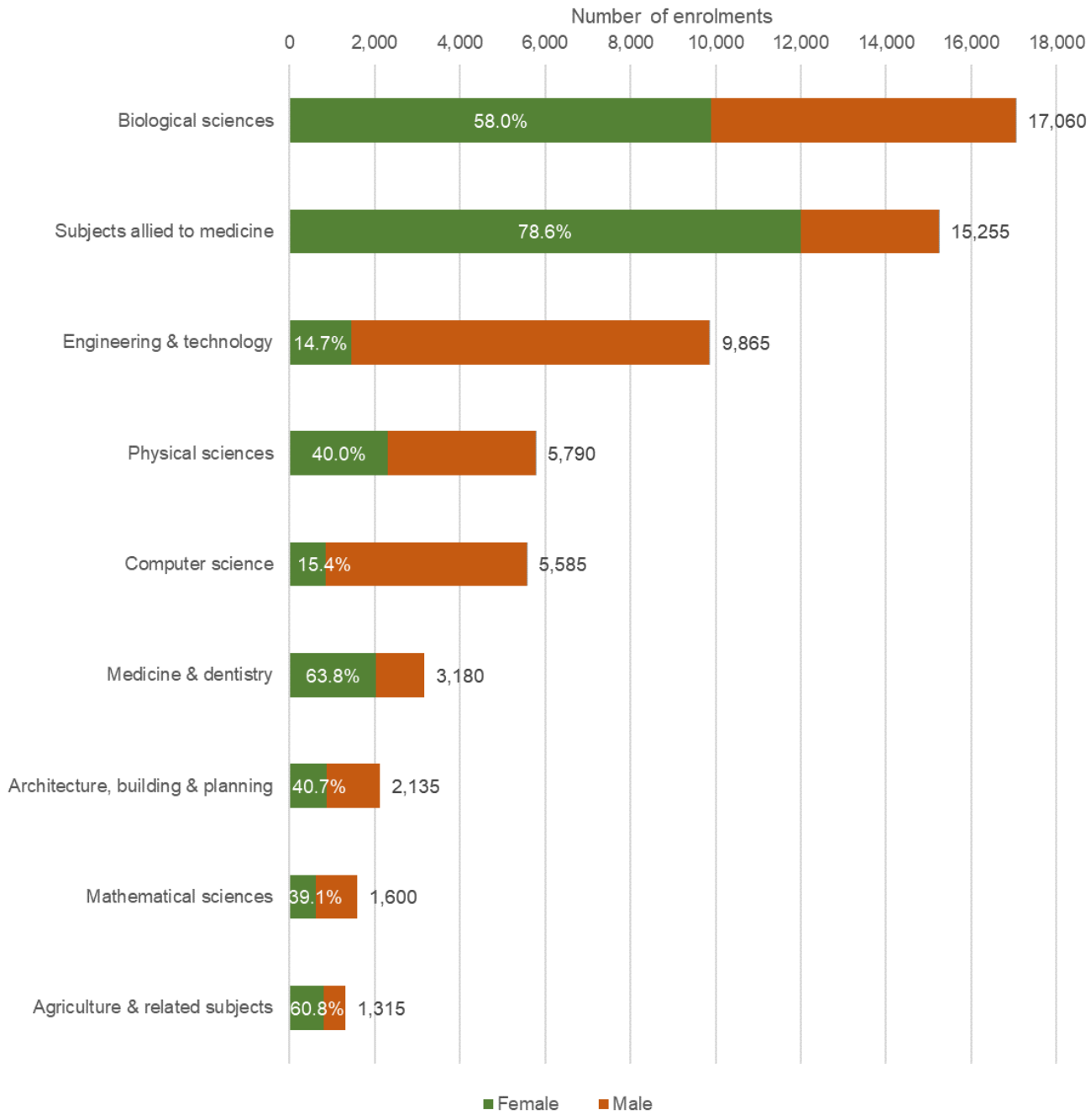
Figure 23. Student enrolments at HEIs in Wales in STEM courses by gender*



*STEM courses based on HESA's 'science subject area' definition.
Source: HESA Student Record

The data above is reflected in data showing that an increasing share of females choose science subjects over non-science subjects at HEIs in Wales. The data in Figure 24 show that the percentage of females who enrolled onto science subject area courses increased from 37 per cent in 2013/14 to 43 per cent in 2017/18. The data also show that a higher percentage of males enrolled on science subject area courses at HEIs in Wales in each year from 2013/14 to 2017/18.

Figure 24. Number of enrolments on HE STEM courses in Wales 2017/18, and corresponding percentage of those enrolling that are females



*STEM courses based on HESA's 'science subject area' definition.
Source: HESA Student Record

Table 19 shows that, between 2013/14 and 2017/18, the largest percentage increases in the number of females enrolling onto HE STEM subjects at HEIs in Wales were in: Subjects allied to medicine; Biological sciences; Agriculture and related subjects; and Architecture, building and planning. Over the same period, the largest decreases in the number of female enrolments were in Medicine and dentistry (although numbers of females fell by less than

males) and Computer science (where the number of enrolments fell in comparison to a small increase among males.

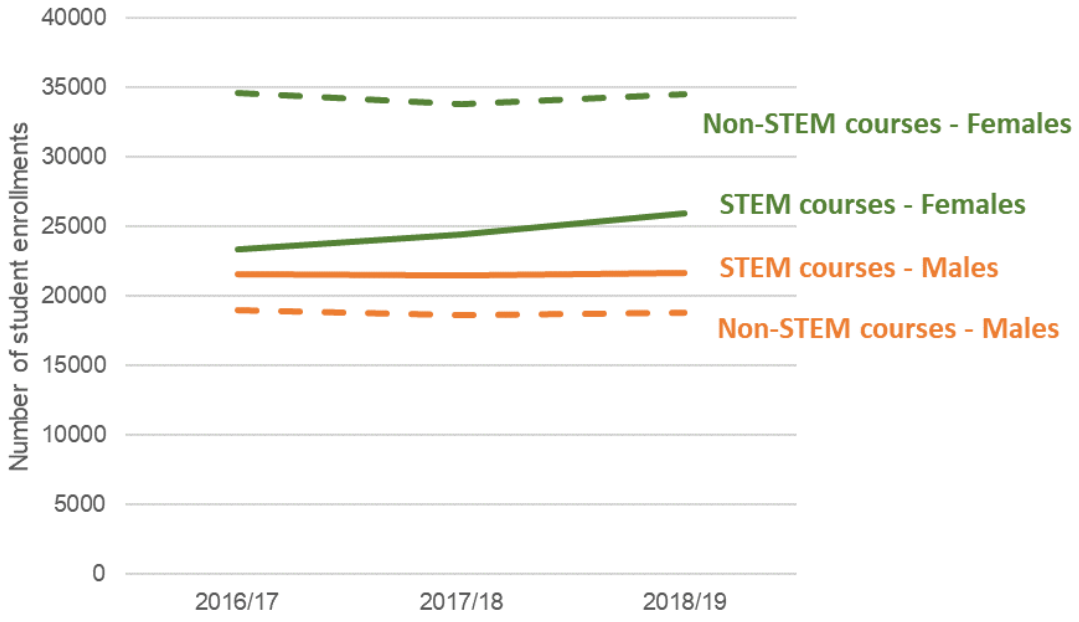
Table 19. Percentage change in enrolments on HE STEM courses at HEIs in Wales by gender 2013/14 to 2017/18**

Subject Area	Female	Male	Other	Total
Medicine & dentistry	-14.3%	-32.0%	*	-21.6%
Subjects allied to medicine	22.1%	20.6%	200.0%	21.9%
Biological sciences	22.7%	0.9%	*	12.6%
Agriculture & related subjects	19.4%	-16.3%	*	1.9%
Physical sciences	12.9%	-1.4%	*	3.9%
Mathematical sciences	-5.3%	3.7%	*	0.3%
Computer science	-10.4%	0.9%	*	-1.0%
Engineering & technology	2.5%	-4.8%	0.0%	-3.8%
Architecture, building & planning	23.4%	2.8%	*	10.1%
Total - STEM courses	15.4%	-1.2%	266.7%	6.5%
Total – All subjects	-1.5%	-10.2%	283.3%	-5.5%

*No students recorded as 'other' in 2013/14. **STEM courses based on HESA's 'science subject area' definition.
Source: HESA Student Record

The Welsh Government also publishes data from HESA which shows the subjects that students who are normally resident in Wales (Welsh domiciled students) study. The data in Figure 25 show that an increasing number of Welsh-domiciled females have enrolled on HE STEM courses over the last three years, while the number of males remain fairly static.

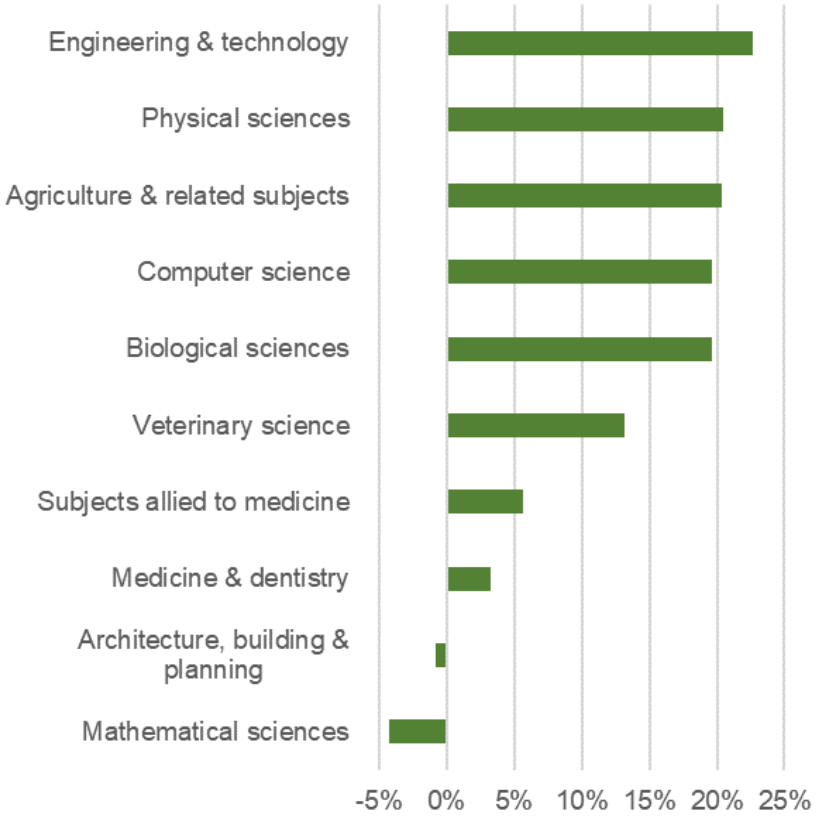
Figure 25. Number of Welsh-domiciled students enrolling on STEM and non-STEM courses at HEIs across the UK



Source: HESA Student Record

Figure 26 shows that the largest percentage increases in the number of enrolments by Welsh-domiciled females were seen in Engineering & technology, Physical sciences, Agriculture & related subjects, Computer science and Biological sciences.

Figure 26. Percentage change in the number of enrolments by Welsh-domiciled females on HE STEM courses at UK HEIs 2016/17 - 2018/19

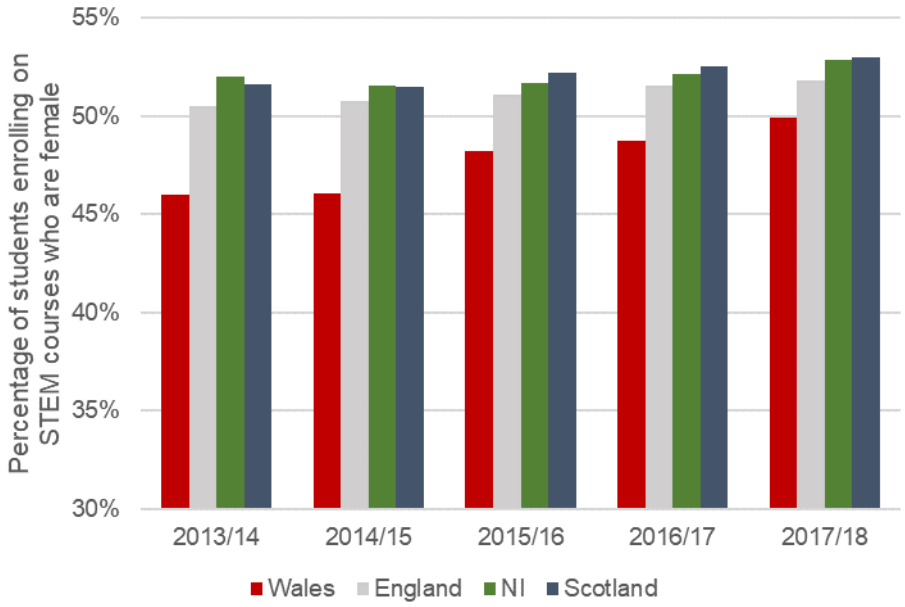


Source: HESA Student Record

3.6.2 Comparing HE data with other UK nations

At HEIs in Wales, the percentage of those enrolling on HE STEM courses who are female (regardless of where they are domiciled) has increased from 46 per cent in 2013/14 to 49.9 per cent in 2017/18 (Figure 27). Whilst the gap between male and female participation has narrowed, the percentage of females remains slightly behind the rest of the UK. In 2017/18, the percentage of those enrolling on HE courses in STEM courses who are female was 53.0 per cent in Scotland, 52.9 per cent in Northern Ireland and 51.8 per cent in England.

Figure 27. Percentage of students enrolling on HE STEM courses who are female.



Note: data are based on the country in which students study, rather than where they are domiciled
*STEM courses based on HESA's 'science subject area' definition.
Source: HESA Student Record

When comparing individual subject areas with other UK nations, Table 20 shows that Wales has a higher percentage of enrolments on Medicine and Dentistry courses who are female. However, the percentage of those enrolling on Biological Sciences, Physical Sciences, Computer science and Engineering and technology courses is lower than in England, Scotland and Northern Ireland.

Table 20. Percentage of those enrolling on HE STEM courses who are female by subject area and UK nation 2017/18

Subject Area	Percentage of students enrolling on STEM courses who were female*				
	Wales	England	Scotland	NI	UK
Medicine & dentistry	63.8%	57.3%	60.5%	62.5%	58.2%
Subjects allied to medicine	78.6%	78.6%	81.7%	82.1%	79.1%
Biological sciences	58.0%	64.4%	65.8%	62.6%	64.1%
Veterinary science		76.9%	81.3%		77.7%
Agriculture & related subjects	60.8%	64.9%	61.4%	60.0%	64.0%
Physical sciences	40.0%	42.2%	45.2%	44.0%	42.5%
Mathematical sciences	39.1%	36.2%	41.6%	41.9%	36.9%
Computer science	15.4%	17.0%	20.7%	23.9%	17.6%
Engineering & technology	14.7%	18.2%	19.4%	20.8%	18.2%
Architecture, building & planning	40.7%	37.8%	42.5%	29.1%	38.2%
Total - STEM courses	**49.9%**	**51.8%**	**53.0%**	**52.9%**	**51.9%**

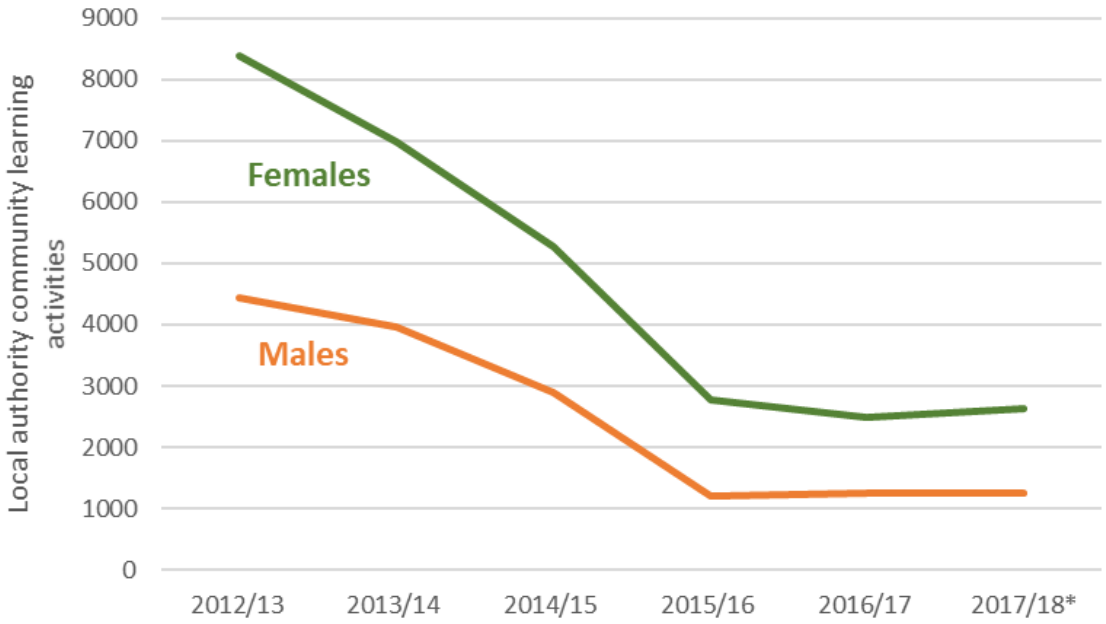
Green text denotes courses where over 55 per cent of enrolments were female. **Orange text** denotes courses where fewer than 45 per cent of enrolments were female.
*STEM courses based on HESA's 'science subject area' definition.
Source: HESA Student Record

3.7 Adult learning

The Welsh Government publishes data on the number of learning activities in the adult learning sector by subject and gender. The data show that between 2012/13 and 2017/18, the number of local authority community learning activities fell by around 60 per cent overall. Figure 28 shows that, in STEM subjects, the numbers fell by 69 per cent among females and 72 per cent among males over this period.[24]

[24] The authors have used the same definition of STEM subjects for Adult Learning as was used for FE. These are: Medicine and Dentistry; Nursing and Subjects and Vocations Allied to Medicine; Science; Mathematics and Statistics; Agriculture; Horticulture and Forestry; Animal Care and Veterinary Science; Environmental Conservation; Other (Agriculture, Horticulture and Animal Care); Engineering; Manufacturing Technologies; Transportation Operations and Maintenance; Other (Engineering and Manufacturing Technologies); Architecture; Building and Construction; Other (Construction, Planning and the Built Environment); ICT Practitioners; ICT for Users; Other (Information and Communication Technology). Archaeology and Archaeological Sciences; Accounting and Finance.

Figure 28. Local authority community learning activities in STEM subjects by gender



Source: Lifelong Learning Wales Record, Welsh Government

Key findings: Post-16 education

A Levels

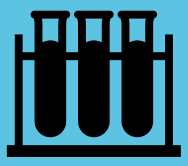
- At **A level**, a higher percentage of girls than boys achieve an **A/A*** or an **A*-C grade** in most STEM subjects.
- Far fewer girls than boys enter **A levels in ICT and DT**, despite a higher percentage of girls achieving A*-C grades.
  - A higher percentage of girls than boys achieved A*-C grades across all A level subjects except Mathematics in 18/19.
  - But fewer girls than boys enter Maths, Physics, ICT and DT A Levels.
- The number of girls entering **ICT** and **DT A levels** are falling faster than boys.

Further Education, Work-based and Adult Learning

- In **FE,** there has been a larger decline in STEM learning activities among females than males in recent years.
  - Female enrolments comprise just under a third of FE STEM courses (32.4% in 2017/18).
- Wales is the only UK nation where over half of enrolments on **STEM apprenticeships** are from females (52.3% in 2017/18).
  - More females than males undertake **higher level STEM apprenticeships**.
- More females than males enrolled on **STEM adult learning** courses in 2017/18.

Higher Education

- The number of females enrolling on **HE STEM courses** has increased; the gap in the number of entries from females compared with males has largely closed.
  - But 58% of **HE teaching staff** in STEM-related HE areas were male and 42% female in 2017/18.
  - In **biological, mathematical and physical sciences**, two-thirds of the staff were male in 2017/18, while in **engineering and technology**, 81% of staff are male.



4. Education workforce

Data on the education workforce is presented in this section, including initial teacher education (ITE) applications and enrolments, the profile of registered teachers and practitioners and the HE workforce.

4.1 Initial teacher education (ITE)

Data on applications for, and enrolments on ITE courses is collected by UCAS and HESA respectively. This section outlines details on the availability of these data.

4.1.1 ITE Applications

UCAS collect and publish data on the application status of secondary phase Teacher Training applicants by subject as part of their End of Cycle reports from 2016 to 2018 (See Tables B14 and B15 of the 2018 End of Cycle report here). These data are not published by gender, although the gender of applicants is collected by UCAS.

4.1.2 ITE enrolments

The Welsh Government publishes data collected by HESA on the number of First Years from Wales on ITE courses in the UK by subject and gender. Across all subject areas, the number of enrolments by Welsh domiciled students at UK HEIs fell by 35 per cent between 2010/11 and 2017/18. Over the same period, the number of enrolments by Welsh domiciled students on ITE courses in STEM subject areas fell by 42 per cent among females and 47 per cent among males.[25] The subjects with the largest percentage decline among females were Physics (a fall of 67 per cent) Biology (a fall of 54 per cent) and DT (a fall of 45 per cent). Among males, the largest declines were seen in DT and IT. In the Social Sciences, the number of enrolments fell by 21 per cent among females but was static amongst males. If Social Sciences are included in the definition of STEM, then the number of enrolments fell by 37 per cent among females and 38 per cent among males over the period from 2010/11 to 2017/18.

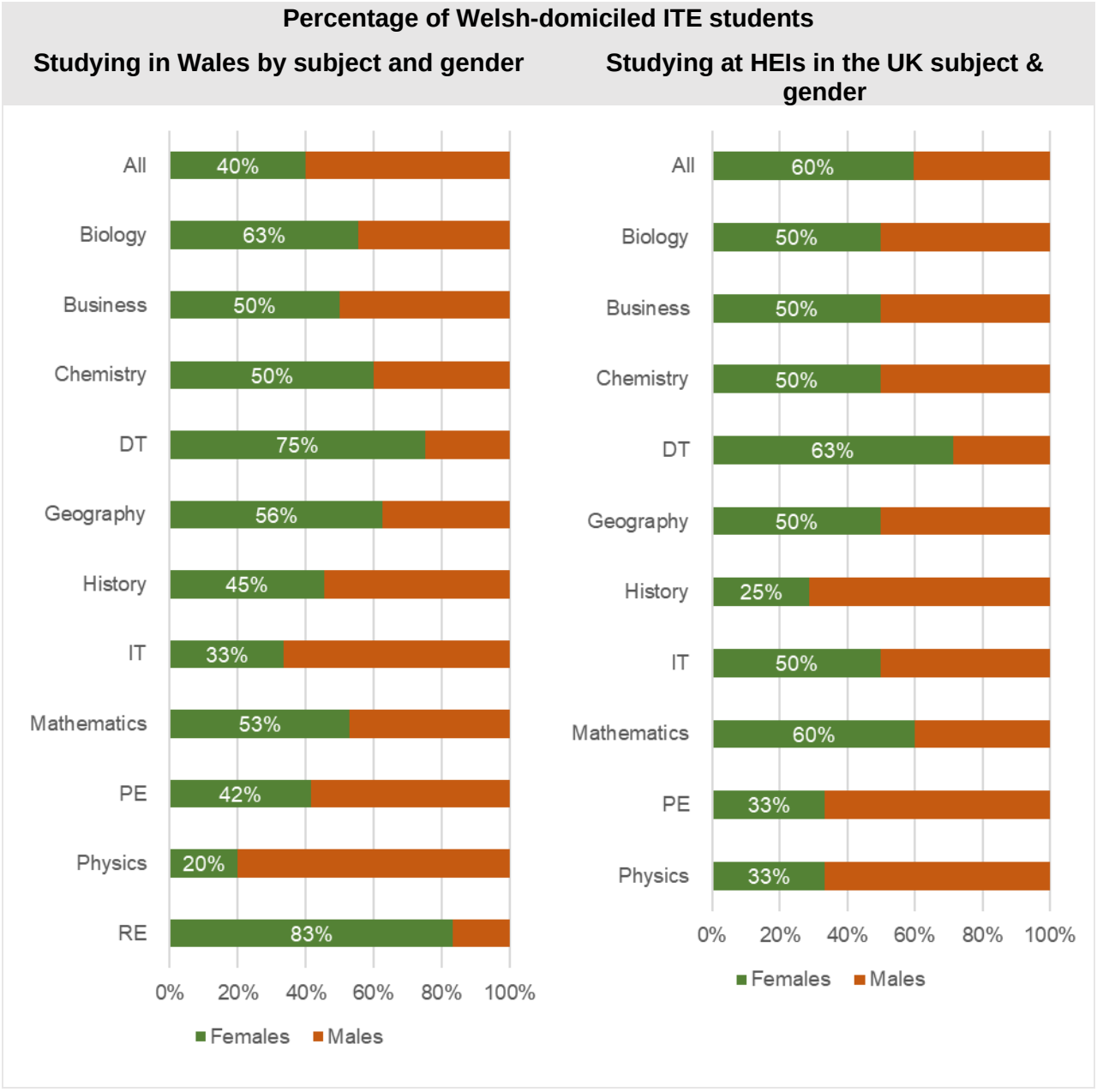
Figure 29 shows that, in 2017/18, 40 per cent of all first year Welsh-domiciled students enrolling on ITE courses in Wales, across all subjects, were females, compared with 60 per cent of Welsh domiciled students enrolling across the UK. In some subjects, most Welsh domiciled students enrolling on ITE courses in Wales were female. These were:

- Chemistry - 50.0 per cent
- Biology - 62.5 per cent
- DT - 75.0 per cent
- Mathematics - 52.9 per cent

However, just a fifth (20 per cent) of those enrolling on ITE Physics courses were female in 2017/18. The full dataset is available in Appendix 1.

[25] Defined by the authors as the following ITE subject areas: Biology; Chemistry; Mathematics; Physics; IT; DT; and General Science.

Figure 29. Percentage of Welsh-domiciled first year students enrolling on ITE courses in Wales and the UK by subject and gender2017/18



Note: Data on RE ITE students by gender unavailable for students studying at HEIs in Wales
Source: HESA Student Record

4.1.3 Attainment

The Education Workforce Council (EWC) publishes data on the results of ITE students annually. The data for secondary teachers is published by subject area and, separately, is published by gender. However, the published data are not cross tabulated by both subject area and gender.[26]

[26] See most recent EWC report: ITET student results 2018-19

4.2 Registered teachers and practitioners

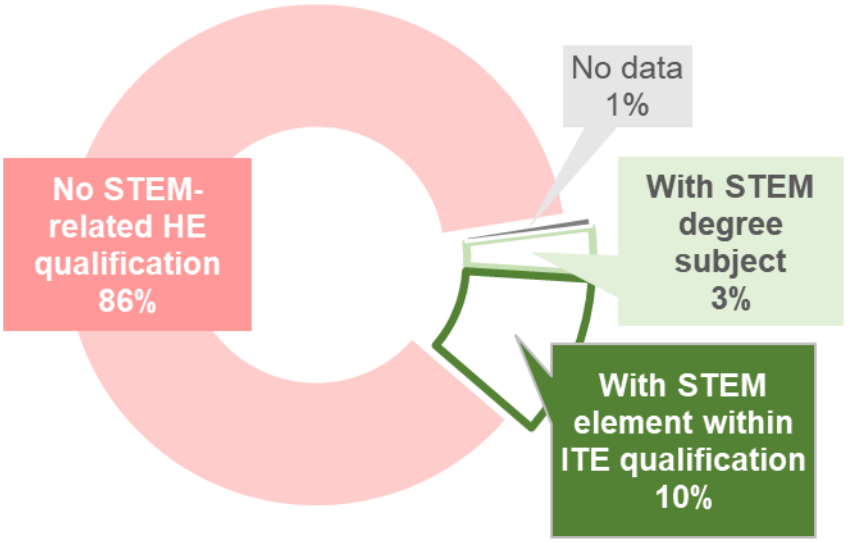
The EWC maintain a Register of Education Practitioners and produces annual statistical digests that provide data on the workforce of schools, FEIs and Work-based learning (WBL) providers. In 2019, three-quarters (75.5 per cent) of all school teachers (both primary and secondary) were female, and a quarter (24.5 per cent) were male. Analysis of EWC data for primary and secondary stages is presented below, followed by FE and WBL providers.[27]

4.2.1 Primary stage

In primary schools, Welsh Government data show that 83.2 per cent of all teachers were female and 16.8 per cent male in 2019. EWC data show that only a small minority of teachers in primary schools have STEM-related HE qualifications. **Figure 30** below shows that, of the 13,080 school teachers employed in the primary stage in 2019:

- Three per cent (387) had a degree or postgraduate certificate in a STEM subject;
    - 41 per cent of these were in General Science, 35 per cent in Biology and 13 per cent Mathematics;
- Ten per cent (1,314) had a STEM element within ITE qualification;
    - 51 per cent of these were Mathematics and 41 per cent in Combined/General Science.
- 86 per cent (11,271) primary working school teachers either held a postgraduate, degree or other qualification in a non-STEM related subject.

Figure 30. STEM-related qualifications of registered primary school teachers 2019



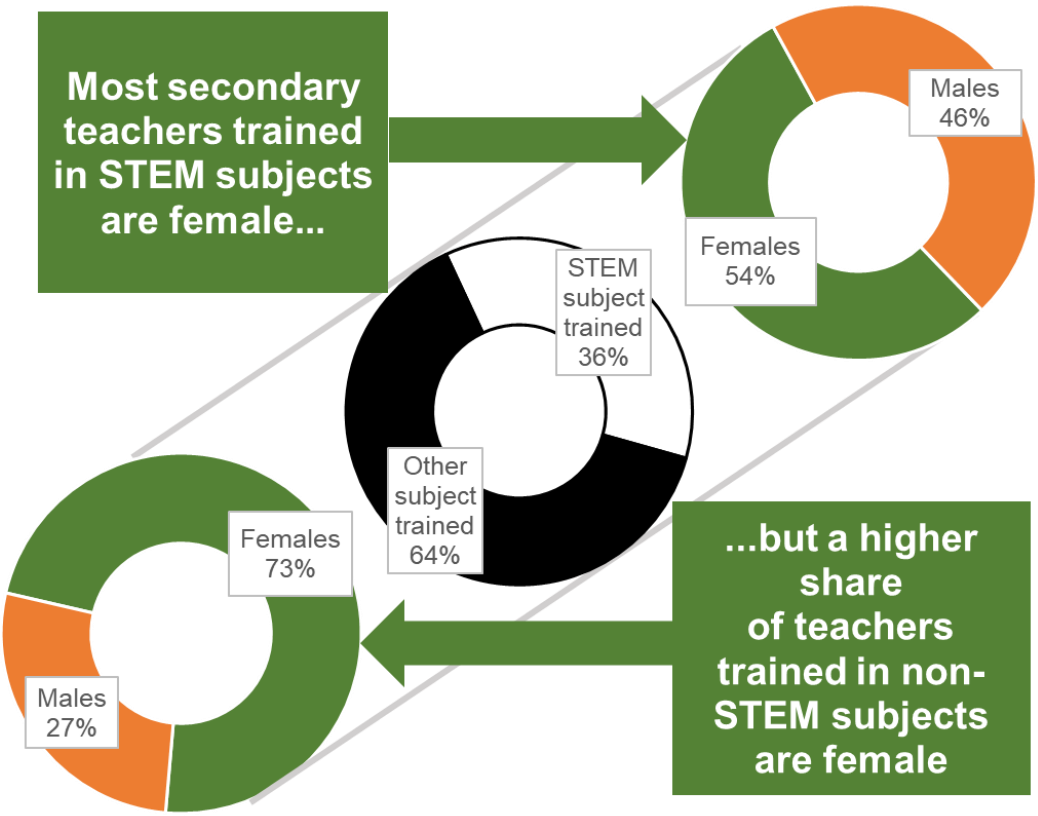
Source: EWC Register of Educational Practitioners

[27] Breakdowns of the data by gender and, separately, subject area are published by EWC (See 2019 statistics digest). However, the published data are not cross tabulated by both gender and subject area. A bespoke dataset was commissioned from EWC for this study, enabling cross tabulated data to be analysed in this report.

4.2.3 Secondary phase

In 2019, there were 14,659 registered secondary school teachers on the EWC Register of Educational Practitioners: 5,321 (36 per cent) trained in STEM subjects and 9,338 (64 per cent) trained in other subjects. **Figure 31** shows that, although the majority of teachers (54 per cent) trained in STEM subjects were female, this was lower than the overall percentage of secondary school teachers (66 per cent) and teachers trained in non-STEM subjects (73 per cent). The gender balance of STEM and non-STEM trained teachers remained fairly static between 2017 and 2019, and a similar gender balance can be seen in the data on teachers teaching STEM subjects (54 per cent female) and non-STEM subjects (74 per cent female) by gender (See full dataset in Appendix 1).

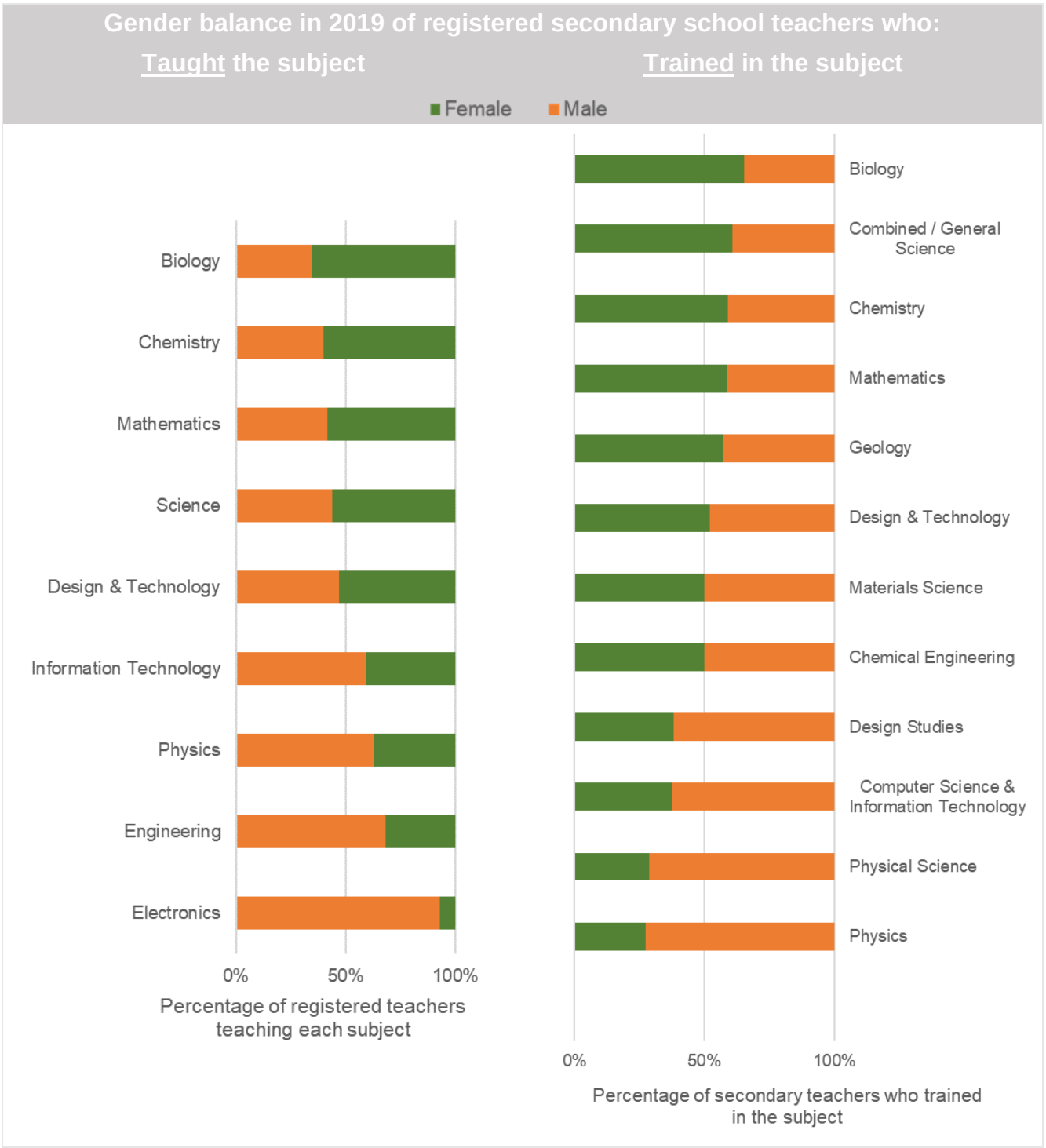
Figure 31. Percentage of registered secondary school teachers who were trained in STEM subjects and other subjects by gender 2019



Source: EWC Register of Educational Practitioners

The data show that, in 2019, most teachers teaching (and trained in) Biology, Chemistry, Mathematics, General Science and DT were female. **Figure 32** shows there was an even gender balance in Chemistry, while the majority of teachers who taught and were trained in ICT, Physics, Engineering and Electronics were male. Just over a quarter (27 per cent) of secondary teachers who trained in Physics were female, compared with 37 per cent who taught it.

Figure 32. Percentage of registered secondary school teachers who taught and were trained in individual subjects by gender 2019



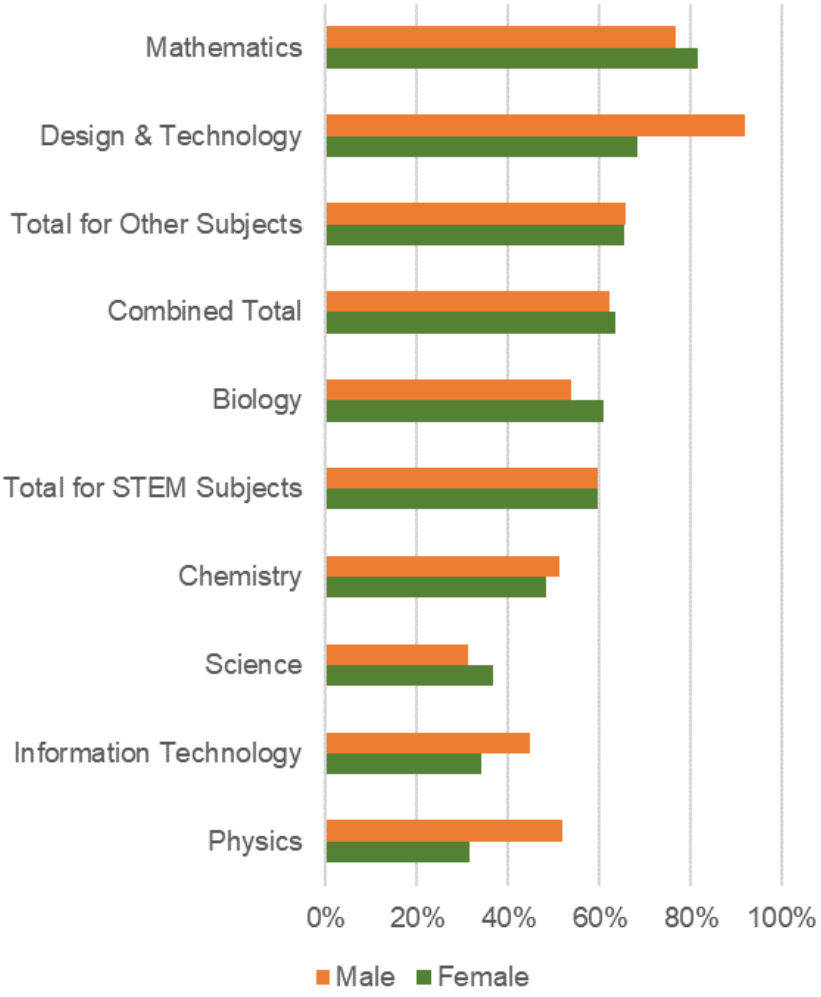
Source: EWC Register of Educational Practitioners

Figure 33 below shows some notable differences in the percentages of male and female teachers teaching individual subjects who are subject specialists (i.e. they trained in those subjects). The largest disparities were in:

- DT - 92 per cent of male teachers trained in the subject compared with 68 per cent of females;

- Physics – 52 per cent of male teachers trained in the subject compared with 31 per cent of females;
- ICT – 45 per cent of male teachers trained in the subject compared with 34 per cent of females.

Figure 33. Percentage of secondary teachers teaching individual subjects who were trained in those subjects by gender



Source: EWC Register of Educational Practitioners

4.2.4 Further education and work-based learning (WBL) practitioners

The data in Table 21 show that most FE STEM subject practitioners registered with EWC are male (63 per cent), compared with a female majority (64 per cent) in other subjects. The gap is largely driven by a notable gender imbalance in Engineering, where 93 per cent of registered practitioners are male.

Table 21. Number of further education teachers registered with EWC by subject taught and gender

Subject Taught	Female		Male		Total	
	Number	%	Number	%	Number	%
Design and Technology	15	56%	12	44%	27	100%
Engineering	20	7%	252	93%	272	100%
ICT	86	49%	91	51%	177	100%
Mathematics	90	50%	92	51%	182	100%
Science	113	53%	99	47%	212	100%
Total for STEM FE Teachers	324	37%	546	63%	870	100%
Total for Other subjects	1,891	64%	1,079	36%	2,970	100%
Combined Total	2,215	58%	1,625	42%	3,840	100%

Source: EWC Register of Educational Practitioners

A fifth (20 per cent) of registered STEM subject practitioners in WBL providers were female, compared with almost three-quarters (73 per cent) in other subject areas. The full dataset is included in Appendix 1.

4.2.5 Teacher recruitment

Data on teacher recruitment is not currently available by gender. Welsh Government publishes the following data relating to teacher recruitment and retention annually, but the data are not submitted by gender to Welsh Government from local authorities.

- Teacher recruitment: number of posts where an appointment was made by subject and year
- Teacher recruitment: number of applications received by subject and year
- Teacher retention: teachers who left the profession by subject and destination

From 2019, Welsh Government will be collecting individual-level data on the school workforce in a new annual data collection – the School Workforce Annual Census. This will be based on data gathered via two returns: one from the local authority on pay, contracts and absences; and another from schools which will include staff characteristics, roles, curriculum, recruitment and retention. The School Workforce Annual Census will enable better data to be gathered on the school workforce by gender, including the curriculum taught and pay. In future years, it should therefore be possible to examine recruitment and retention data by gender.[28]

[28] Further information on the School Workforce Annual Census is available at: https://gov.wales/school-workforce-annual-census-swac.

4.3 Higher Education workforce

Data on the HE workforce in Wales is collected by HESA through the Higher Education Staff Record (HESR), and data on the number of teaching staff are published by Welsh Government, broken down by groups of subjects described as 'cost centres'.[29] In the analysis below, the 'cost centres' have been grouped into two categories (defined by the authors):

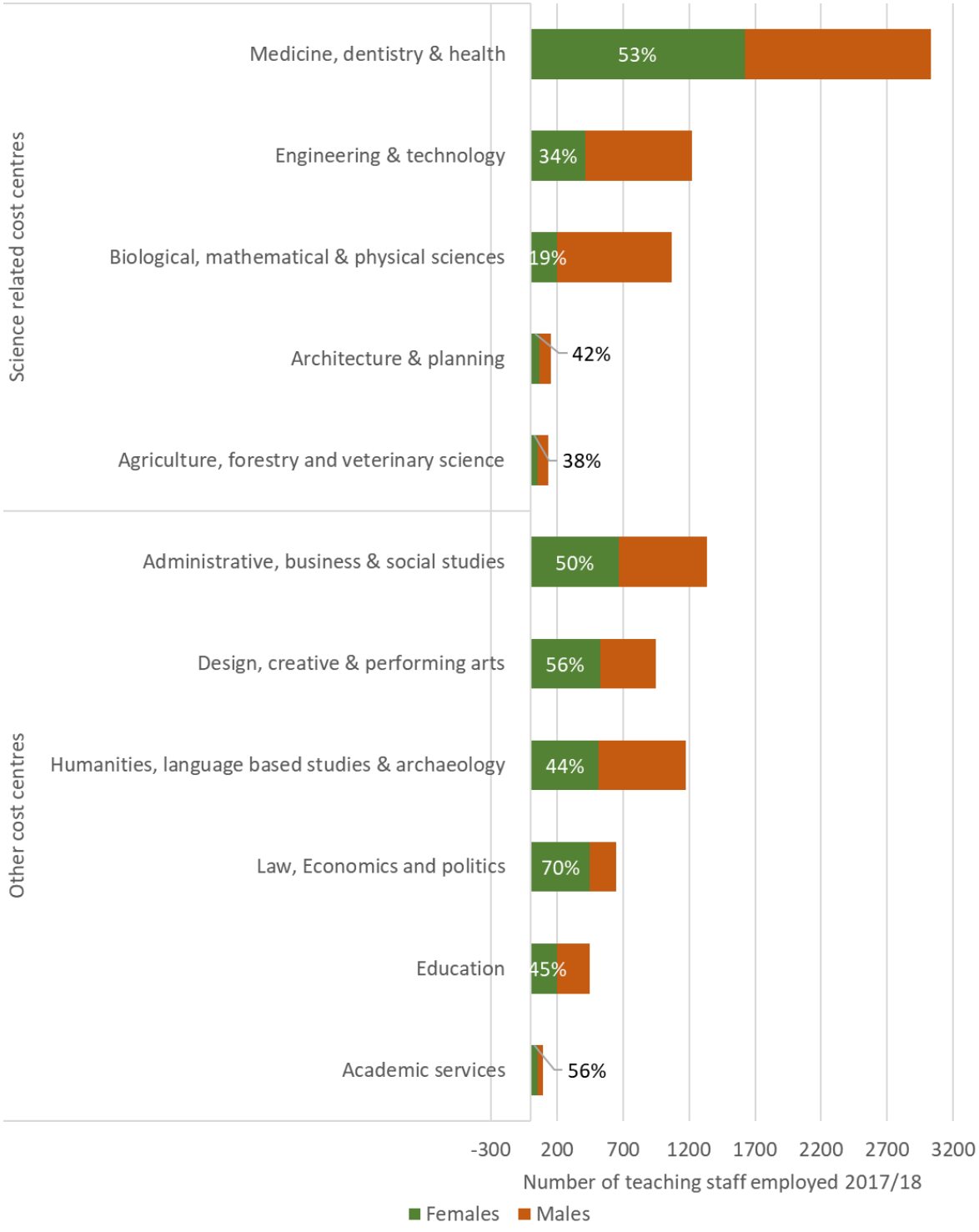
- STEM-related cost centres
    - Agriculture, forestry and veterinary science
    - Architecture & planning
    - Biological, mathematical & physical sciences
    - Engineering & technology
    - Medicine, dentistry & health
- Other cost centres
    - Design, creative & performing arts
    - Academic services
    - Administrative, business & social studies
    - Education
    - Humanities, language-based studies & archaeology
    - Law, Economics and politics

The most recent data show that just over half (53 per cent) of the HE teaching staff were male in 2017/18, with just under half female (46 per cent). The gender gap was larger within STEM-related cost centres, where 58 per cent of staff were male and 42 per cent female in 2017/18, than in other cost centres, where 52 per cent were female and 48 per cent male.

Medicine, dentistry and health teaching staff accounted for over half (54 per cent) the teaching staff in STEM-related cost centres, and within this cost centre just over half the workforce is female (53 per cent). However, in biological, mathematical and physical sciences, two-thirds of the staff were male, while in engineering and technology, 81 per cent of staff are male. The gender balance of the teaching workforce in each of these cost centres is illustrated in Figure 34.

[29] See Staff teaching in Welsh at Welsh Universities in Full-Person Equivalents (FPE) by cost centre and Welsh teaching ability at: https://statswales.gov.wales/v/HCn9

Figure 34. Number of female and male teaching staff employed by HEI cost centre in Wales

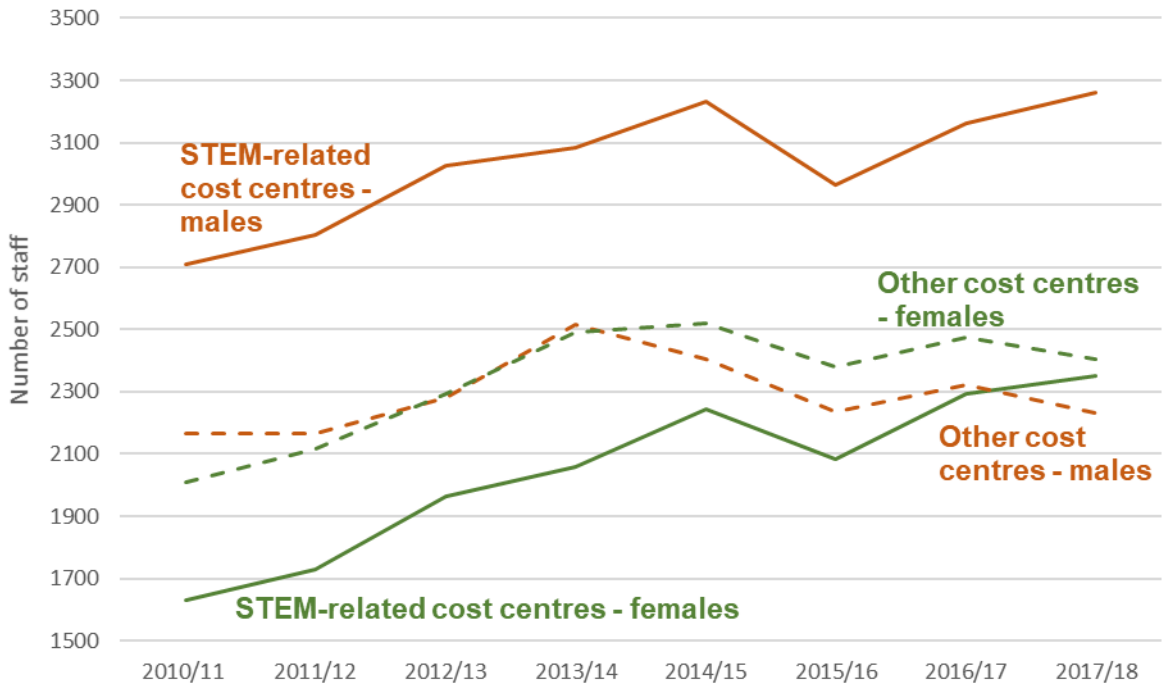


Source: Higher education staff record, HESA and Welsh Government.

There was an improvement in the gender balance of the HE teaching workforce between 2010/11 and 2017/18, with the gap between the number of female and male HE teaching staff falling overall as well as within almost all HE cost centres. The data show that the total

number of HE teaching staff increased by 18 per cent between 2010/11 and 2017/18, from 8,670 to 10,255. Over this period, the number of female teaching staff increased by 28 per cent, and males by 11 per cent, with higher increases in STEM-related cost centres, compared with other subjects. Within STEM-related cost centres, the overall number of teaching staff increased by 29 per cent; a 44 per cent increase in the number of females and 20 per cent in males. In other cost centres, the total number of teaching staff increased by 20 per cent; a 31 per cent increase in the number of females and 13 per cent in males. Figure 35 shows the number of female and male teaching staff in STEM-related and other cost centres between 2010/11 and 2017/18. It illustrates that the gap between the number of females working in STEM and other cost centres has narrowed over this period. However, the gap between the number of male teaching staff in STEM-related and other cost centres has increased slightly over the same period.

Figure 35. Number of male and female teaching staff in STEM-related and other cost centres at HEIs in Wales 2010/11 - 2017/18

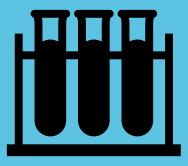


Source: Higher education staff record, HESA and Welsh Government.

Key findings: Education workforce

Initial Teacher Education

- Enrolments by Welsh domiciled students on **ITE courses** falling faster in STEM subjects than other subjects
  - 2010/11 - 17/18: fell by 42% among females and 47% among males.
- Most Welsh domiciled students enrolling on **DT** (75%), **Biology** (63%), and **Mathematics** (53%) ITE courses in Wales were female in 2017/18.
  - However, only 20% of those enrolling on ITE **Physics** courses were female in 2017/18.
- Only a small **minority of primary teachers (13%) have STEM-related HE qualifications**.



Registered teachers and practitioners

- **Most secondary teachers (54%) trained in STEM subjects were female**
  - Lower than average for secondary teachers (66% female) and teachers trained in **non-STEM subjects (73% female).**
- A lower percentage of female teachers are **subject specialists** in some subjects (i.e. trained in those subjects).
  - **DT**: 92% males trained in the subject; 68% females;
  - **Physics**: 52% males; 31% females;
  - **ICT** – 45% males; 34% females.
- Most **FE (63%)** and **Work-based learning (WBL) (80%) STEM practitioners** are male, and in Engineering 93% of FE practitioners are male.

Higher Education

- 58% of **HE teaching staff** in STEM HE courses were male and 42% female in 2017/18.
  - In **biological, mathematical and physical sciences**, two-thirds of the staff were male in 2017/18, while in **engineering and technology**, 81% of staff are male.

5. The workforce, business and enterprise

This section presents data on gender equality in terms of employment, earnings, business ownership or management and entrepreneurship in sectors and occupations relating to STEM.

5.1 Employment

The Office for National Statistics (ONS) publishes data from the Annual Population Survey which provide data on the number in employment by sector, occupation and gender from 2005/06 to 2018/19.

The two main categories of occupation which relate to STEM are defined as:

- Science, research, engineering and technology (SRET) professionals; and
- Science, engineering and technology (SRET) associate professionals.[30]

In the analysis below, SRET professionals and SRET associate professionals are used as proxy data for STEM occupations and are referred to as STEM professionals and STEM associate professionals respectively.

Figure 36 shows that that the number of females and males employed as STEM professionals and associate professionals increased between 2005/06 and 2018/19.

The number employed as STEM professionals:

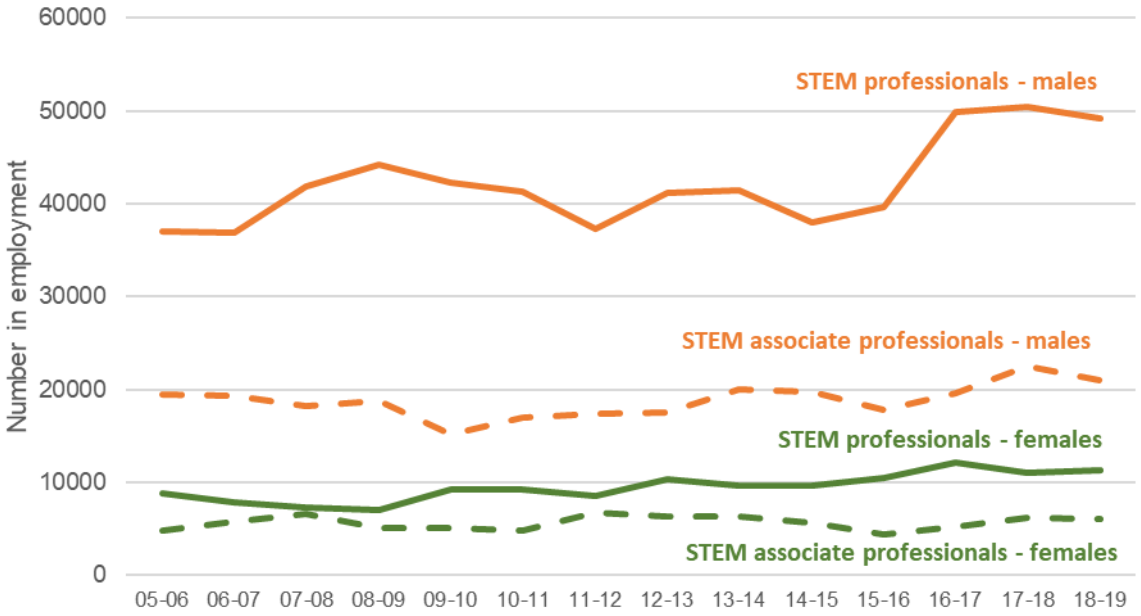
- increased by over a quarter among females from 8,800 in 2005/06 to 11,300 in 2018/19 - an increase of 28 per cent.
- increased by a third among males from 37,000 to 49,200 - a 33 per cent increase.

The number employed as STEM associate professionals:

- increased by over a quarter among females from 4,800 in 2005/06 to 6,100 in 2018/19 - an increase of 27 per cent.
- increased among males from 19,500 to 21,000 – an eight per cent increase.[31]

[30] Both these categories are examples of 'two-digit' Standard Occupational Classification codes.
[31] The SRET SOC codes are used as a proxy for STEM in this analysis. Some caution should be taken in interpreting the data as the confidence intervals (margin of error) on these categories are typically between eight and twelve per cent.

Figure 36. Number employed in STEM occupations in Wales 2005/06 to 2018/19*



*'STEM professionals' and 'STEM associate professionals' defined using 'Science, research, engineering and technology (SRET)' professionals and associate professionals as proxy data.
Note: All annual data refer to year April to March; The confidence interval (margin of error) at the 95 per cent confidence level for the data varies (by year, occupation and geography depending on the sample size) but is typically around eight to twelve per cent for the categories listed.
Source: Annual Population Survey

The two STEM occupational categories above (SRET professionals and associate professionals) can be further split into more detailed occupational categories.[32] Where sample sizes allow, ONS publishes employment data on these as part of the Annual Population Survey. Table 22 shows the percentage change in the number of females and males employed in STEM occupations in Wales between 2005/06 and 2018/19.

Data in these more detailed occupational sub-categories should be interpreted with caution as the sample sizes are small. This means that the confidence intervals (margin of error) for the more detailed occupations are typically in the region of 20-25 per cent. However, the percentage increase in females employed as Engineering Professionals (117 per cent) is significantly higher than the increase among males (four per cent). In contrast, the percentage increases in the numbers of males employed as Information Technology and Telecommunications Professionals (93 per cent) and IT specialist managers (139 per cent) are significantly higher than females (30 per cent and a fall of 16 per cent respectively).

[32] These more detailed occupational categories are known as 'three digit' Standard Occupational Classification codes.

Table 22. Percentage change in number employed in Wales 2005/06 - 2018/19

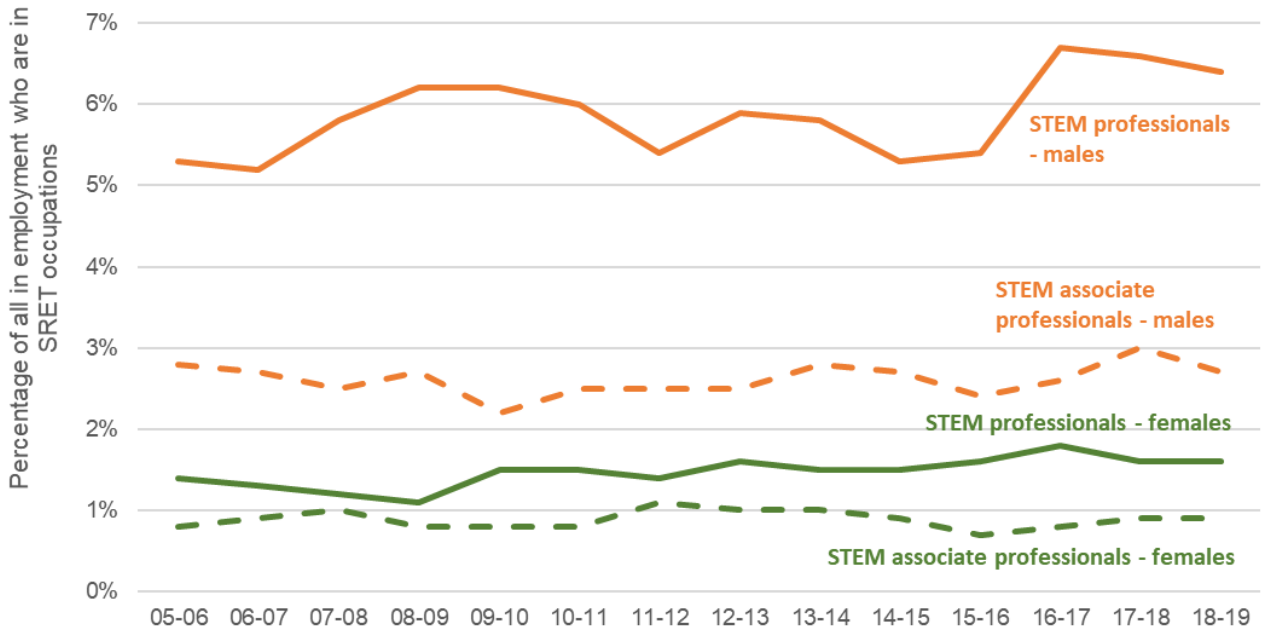
STEM occupation (1)	Percentage change in number employed 05/06 to 18/19	
	Males	Females
STEM professionals (1)	33.0%	28.4%
Natural and Social Science Professionals	-2.3%	13.5%
Natural and social science professionals n.e.c.	-12.5%	33.3%
Engineering Professionals	3.8%	116.7%
Information Technology and Telecommunications Professionals	93.1%	30.0%
IT specialist managers	139.3%	-16.7%
Programmers and software development professionals	91.9%	100.0%
Conservation and Environment Professionals	14.3%	22.2%
Environment professionals	60.0%	16.7%
STEM associate professionals (1)	7.7%	27.1%
Science, Engineering and Production Technicians	20.5%	46.4%
Laboratory technicians	23.5%	29.4%
Information Technology Technicians	-13.3%	-5.6%
IT operations technicians	-3.1%	-10.0%
IT user support technicians	-22.2%	0.0%

Green text denotes occupations where the percentage increase/decrease in employment was over 10 percentage points higher/lower among females. **Orange text** denotes occupations where the percentage increase/decrease in employment was over 10 percentage points higher/lower among males.
Note: All annual data refer to year April to March. Some sub-groups not shown since the group sample size is zero or disclosive (0-2); or estimate and confidence interval unreliable since the group sample size is small (3-9).
Occupations labelled as (1) – uses SRET data as proxy for STEM. The confidence interval (margin of error) at the 95 per cent confidence level for the data varies by occupation and year but is typically around eight to twelve per cent.
All other occupations: The confidence interval (margin of error) at the 95 per cent confidence level varies by occupation and year but is typically around 20-25 per cent for the categories listed.
Source: Annual Population Survey

ONS also publish data on the percentage of all males and females in employment who are in STEM occupations (SRET category used as a proxy for STEM).

Figure 37 shows that the percentage of females employed as STEM professionals in Wales has remained fairly static, increasing slightly from 1.4 to 1.6 per cent between 2005/06 and 2018/19. Over the same period, the percentage of males has fluctuated somewhat, but increased from 5.3 to 6.4 per cent. In terms of STEM associate professionals, the number of females employed has remained fairly static, increasing slightly from 0.8 to 0.9 per cent, while the number of males also remained fairly static, falling slightly from 2.8 to 2.7 per cent.

Figure 37. Percentage of those in employment who are in STEM occupations*



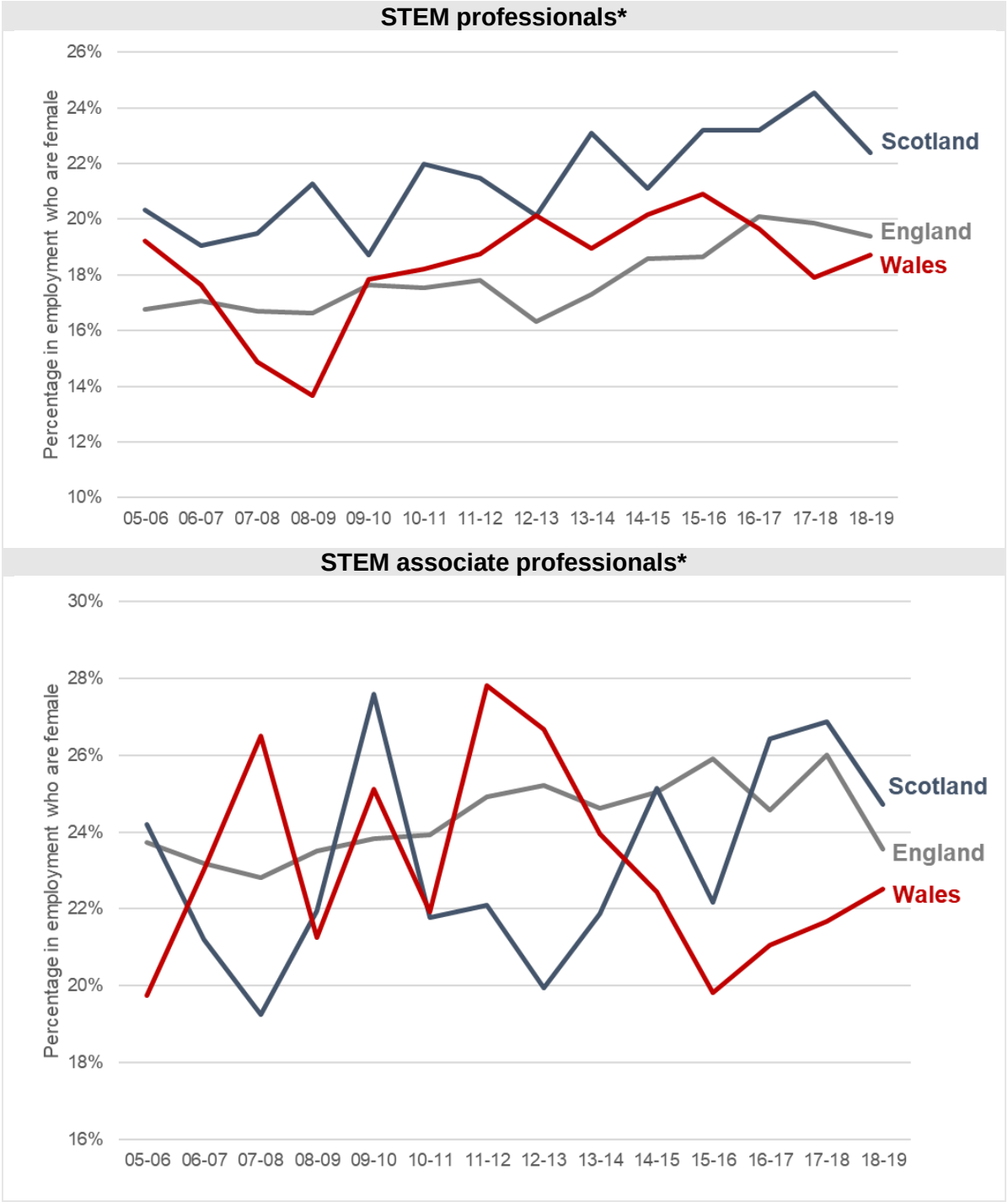
*'STEM professionals' and 'STEM associate professionals' defined using 'Science, research, engineering and technology (SRET)' professionals and associate professionals as proxy data.
Note: All annual data refer to year April to March; The confidence interval (margin of error) for the data varies each year but is typically around 2-3 per cent for the categories listed at the 95 per cent confidence level.
Source: Annual Population Survey

5.1.1 Comparing employment in STEM occupations with other UK nations

The percentage of those employed as STEM professionals who are female can be compared across UK nations (Figure 38). The data show that the percentage of STEM professionals who are female in Wales has been around 18 and 20 per cent since 2009/10. This is broadly in line with data for other UK nations over the same period.[33]

[33] The confidence interval (margin of error) for the data varies each year but is typically around 2-3 per cent for the categories listed at the 95 per cent confidence level.

Figure 38. Percentage of those employed in STEM occupations who are female by UK nation*



*'STEM professionals' and 'STEM associate professionals' defined using 'Science, research, engineering and technology (SRET)' professionals and associate professionals as proxy data.
Note: All annual data refer to year April to March; The confidence interval (margin of error) for the data varies each year but is typically around 3-5 percentage points for the categories and nations listed at the 95 percent confidence level. Northern Ireland not shown due to higher margin of error.
Source: Annual Population Survey

5.2 Earnings

This section examines ONS data relating to the gender pay gap (GPG) between males and females as well as an analysis of large company GPG reports.

5.2.1 Gender pay gap (GPG) data

The ONS publishes a range of earnings data estimates based on the Annual Survey of Hours and Earnings (ASHE). Since 2016, this has included data on the 'gender pay gap' (GPG) in earnings of men and women by industrial sector and occupation. The gender pay gap is expressed as follows:

> *the difference between average hourly earnings (excluding overtime) of men and women as a proportion of average hourly earnings (excluding overtime) of men. For example, a 4% GPG denotes that women earn 4% less, on average, than men. Conversely, a -4% GPG denotes that women earn 4% more, on average, than men.*

Below we present analysis of these data over time, with data prior to 2016 based on the authors' calculations, rather than analysis by the ONS. The GPG for 2011-16 has been derived by the authors by replicating the methodology described by ONS using published average hourly earnings (excluding overtime). The ONS notes that UK-level GPG estimates are 'considered good quality', while Wales-level estimates are 'considered reasonable quality' in the following sectors:

- science, research, engineering and technology (SRET) professionals;
    - described below as STEM professionals;
- science, research, engineering and technology (SRET) associate professionals.
    - described below as STEM associate professionals.[34]

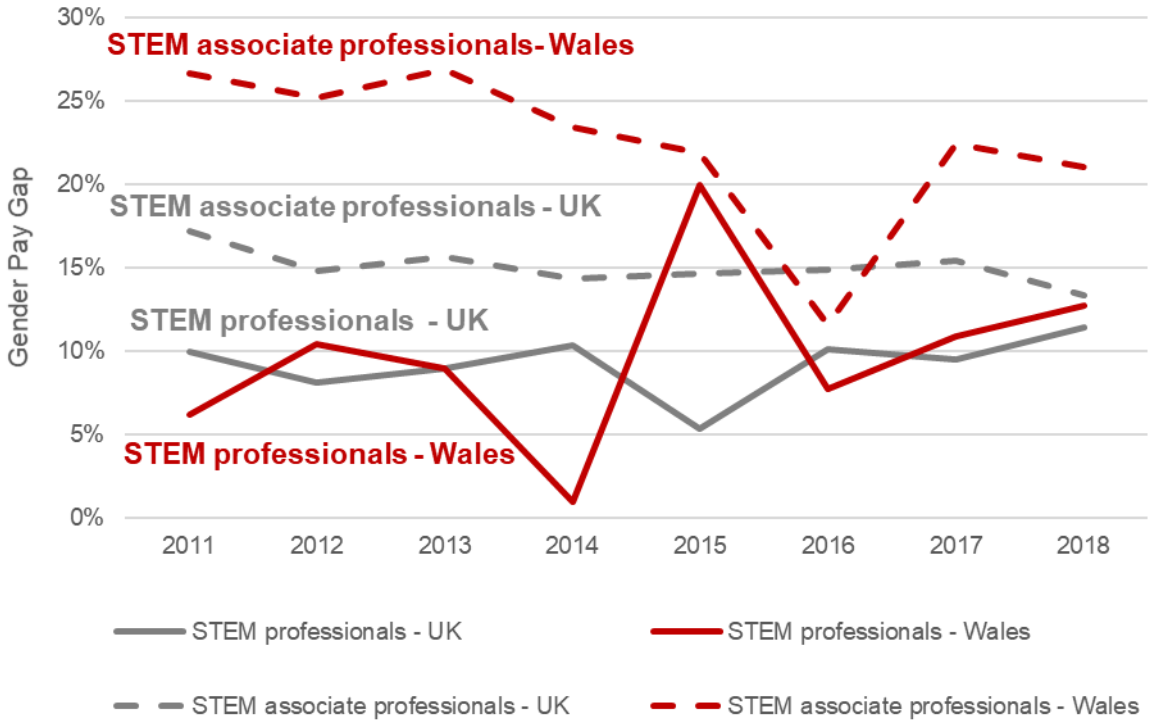
Figure 39 shows that:

- At UK level:
    - the estimated gender pay gap among STEM professionals has been between 8 and 12 per cent in most years from 2011 to 2018 (the exception being a GPG of 5 per cent in 2015).
    - For STEM associate professionals, the estimated GPG has been between 13 and 17 per cent.
- In Wales:
    - the estimated GPG for STEM professionals has fluctuated between one and twenty per cent between 2011 and 2018.

[34] The ONS quality assessment of each estimate is based upon the coefficient of variation (CV) values for the corresponding male and female earnings estimates. The CV is the ratio of the standard error of an estimate to the estimate itself and is expressed as a percentage. The smaller the CV the greater the accuracy of the estimate. The colour coding for the GPG estimates is derived as follows: If the CV values of both the male and female earnings estimates are less than or equal to 5 per cent then the GPG estimate is considered good quality; If the CV value of either (or both) the male or female earnings estimate is greater than 5 per cent and less than or equal to 10 per cent (and the CV of the other estimate is less than or equal to 10 per cent) then the GPG estimate is considered reasonable quality.

- For STEM associate professionals, the estimated GPG has been between 21 and 27 per cent in all years aside from 2016, when it was estimated at 17 per cent.

Figure 39. Gender pay gap among STEM professionals and associate professionals 2011-18*



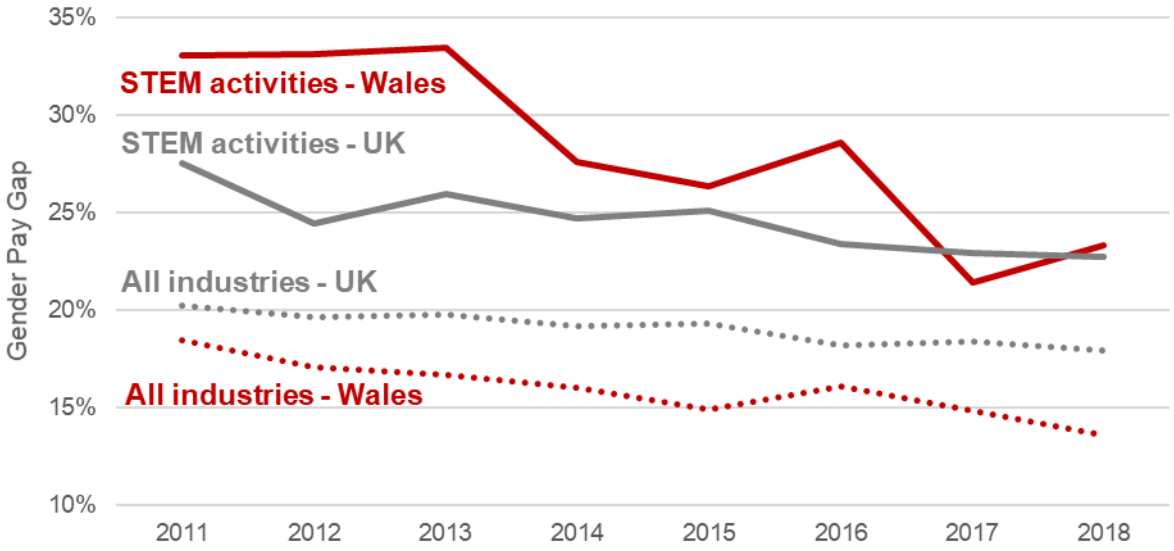
*'STEM professionals' and 'STEM associate professionals' defined using 'Science, research, engineering and technology (SRET)' professionals and associate professionals as proxy data. 2018 data are provisional.
Source: Annual Survey of Hours and Earnings

Earnings estimates based on the ASHE data are also published by industrial sector. Estimates for Professional, Scientific and Technical Activities are available for Wales between 2011 and 2018. This sector is used as proxy data for STEM activities below.

The data in Figure 40 show that:

- The estimated GPG in STEM activities has fallen from 33 to 23 per cent in Wales between 2011 and 2018.
    - The Wales (23.3 per cent) and UK (23.7 per cent) GPG are now similar for STEM activities.
- The estimated GPG is higher in STEM activities (23 per cent) than the average across all industries (14 per cent).
    - This is the case for Wales and the UK, although the gap between STEM activities and all industries has narrowed from 2011-18.
    - The GPG across all industries is lower in Wales (14 per cent) than in the UK (18 per cent).

Figure 40. Gender pay gap between males and females working in STEM activities and all industries in Wales and UK (2011-18)*



*Data for 'Professional, Scientific and Technical Activities' used as proxy for STEM activities. 2018 data are provisional.
Source: Annual Survey of Hours and Earnings

5.2.2 Comparing the GPG in Wales with other UK nations

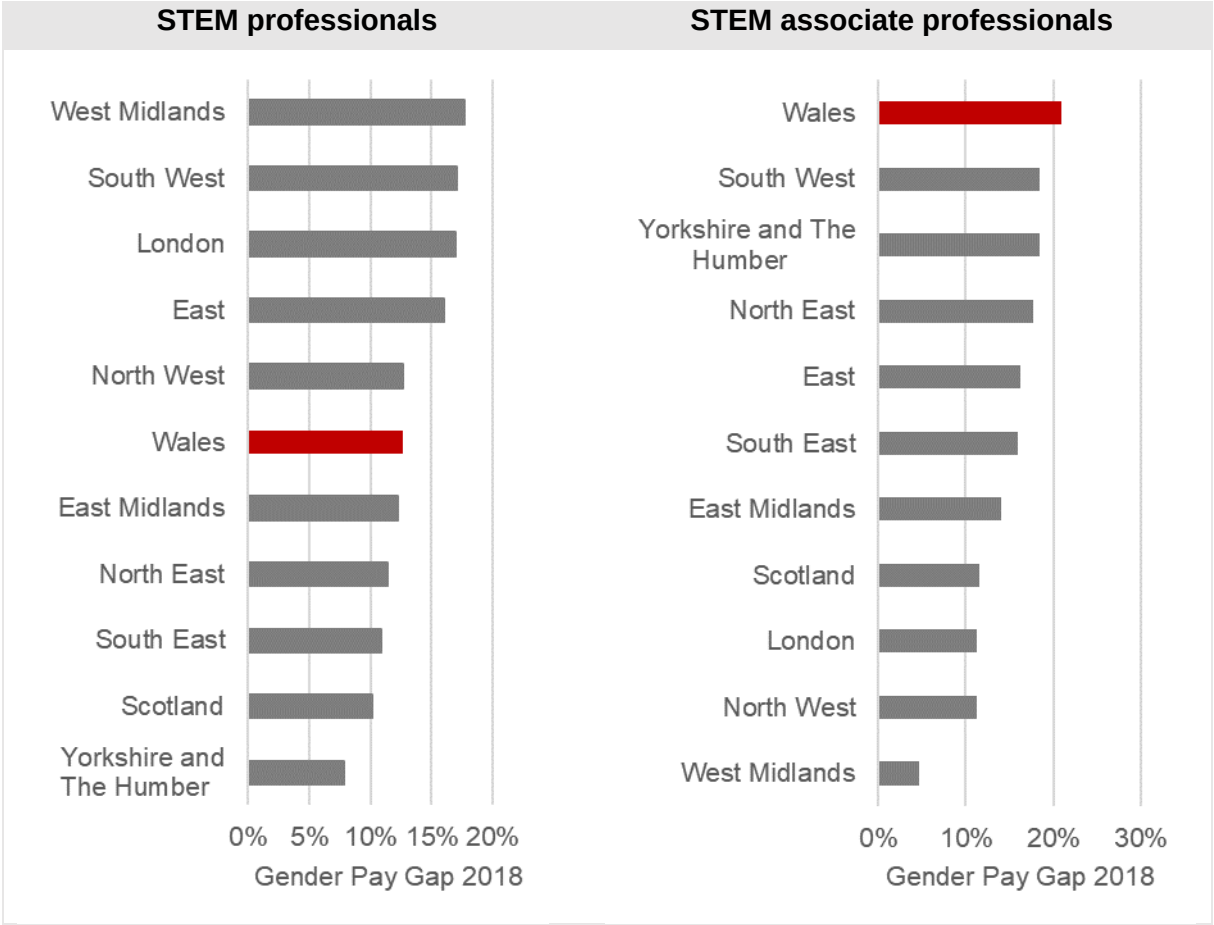
The GPG among STEM professionals (again, using SRET occupations as a proxy) in Wales can be compared with other UK nations and regions.[35] Figure 41 shows that, in 2018:

- The GPG for STEM professionals in Wales was 12.7 per cent, meaning that females were paid 12.7 per cent less on average than males.
    - This was just above the UK average of 11.4 per cent.
    - The GPG varied across the UK, from 17.7 per cent in the West Midlands to 7.8 per cent in Yorkshire and the Humber.

- The GPG for STEM associate professionals in Wales was 21.0 per cent, meaning that females were paid 21.0 per cent less on average than males.
    - This was above the UK average of 13.3 per cent.
    - The GPG varied across other UK nations and regions, from 5 per cent in the West Midlands to 19 per cent in the South West of England.

[35] The data at this level are considered of 'reasonable quality' by the ONS.

Figure 41. GPG for STEM professionals in Wales, Scotland and regions of England 2018



*'STEM professionals' and 'STEM associate professionals' defined using 'Science, research, engineering and technology (SRET)' professionals and associate professionals as proxy data.
Source: Annual Survey of Hours and Earnings. 2018 data are provisional.

5.2.3 Large company gender pay gap reports

In 2017, the UK government introduced regulations that make it mandatory for employers with 250 or more employees to report and publish their GPG information. Employers must submit their GPG data to the UK government's online reporting service and publish their GPG data on their public website, along with a written statement.[36]

The analysis below compares average GPG data for companies in STEM sectors (using Professional, scientific and technical activities as a proxy for STEM) to the average for all companies submitting GPG data. Companies in STEM sectors accounted for around 1.8 per cent of all companies in both years.

[36] Data for individual companies are published on the GPG service web page. Data are available for two complete financial years and one partial year. On average across the two complete annual reports, 10,689 employers submitted a report of their GPG data. See https://gender-pay-gap.service.gov.uk/viewing/download

The data show that the GPG in STEM sectors in the UK was similar to the average across all industries:

- In 2018/19:
    - The GPG in STEM sectors was 12.0 per cent (median hourly pay), compared to 11.9 per cent across all industries.
        - Based on 194 employers in STEM sectors out of 10,816 employers.
- In 2017/18:
    - The GPG in STEM sectors was 11.9 per cent, compared with 11.8 per cent across all industries
        - Based on 181 employers in STEM sectors out of out of 10,561 employers with appropriate SIC codes.

5.3 Business ownership and management

The Office for National Statistics (ONS) publishes an annual Small Business Survey which includes several questions relating to the ownership and management of businesses by women. ONS publishes data on the following for UK nations:

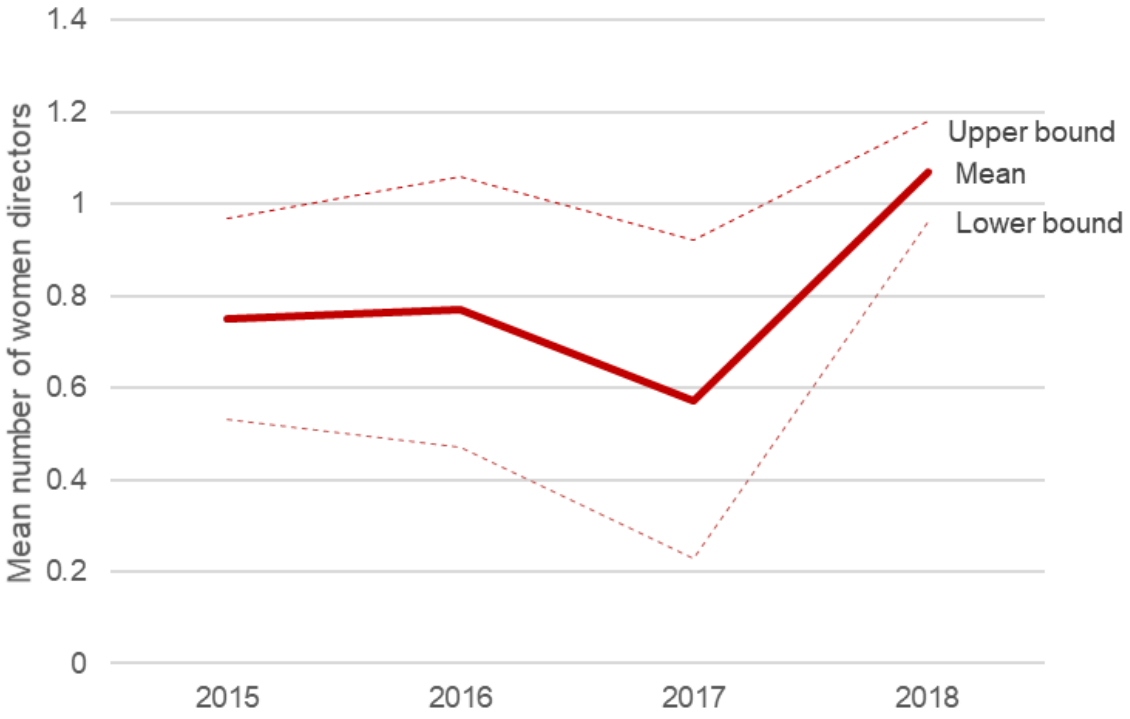
- Percentage of businesses in which more than 50 per cent of business is owned by women;
- Percentage of businesses that are women-led;
- Percentage of owners/directors that are women;
- The average number of directors and partners that are women.

The ONS also publishes this by sector at UK level, but does not routinely publish this sector breakdown by UK nation. The data below have been provided specifically for respondent businesses from the 'professional and scientific' sector in Wales. However, the data are based on small sample sizes and should therefore be interpreted with caution. For this reason, the standard error, lower and upper bounds are reported for each data point. Trend data should be treated with particular caution, and is therefore not analysed in the text accompanying the tables below.

Figure 42 shows that between 2015 and 2018, on average, respondent companies from Wales in the 'professional and scientific' sector had between 0.75 and 1.07 directors who are female.[37] This compares with a UK average of 0.85 in 2018 in this sector.

[37] It is important to note the standard error on this data means that the mean could be as low as 0.53 and as high as 1.18.

Figure 42. Mean number of women directors reported by small businesses in the STEM sector in Wales*

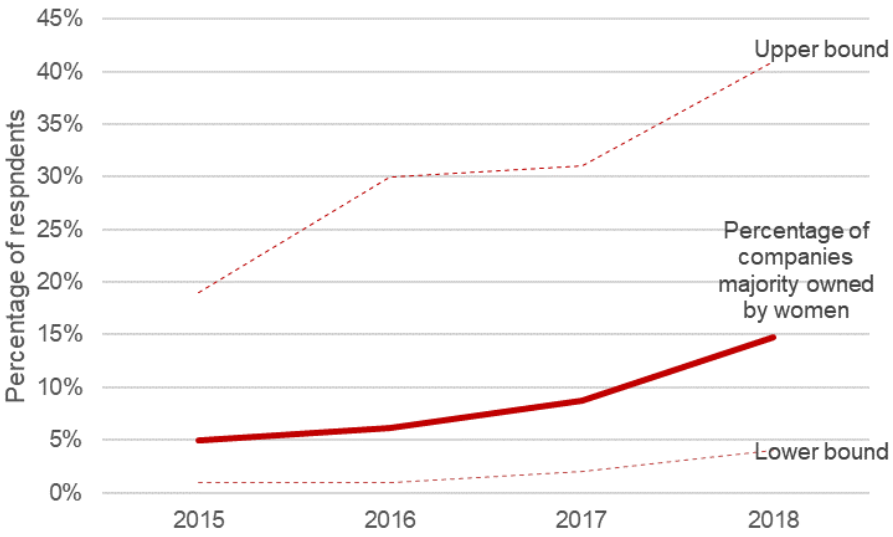


*Based on 15-34 respondents in the professional and scientific sector in Wales each year.

Source: Longitudinal Small Business Survey (2018)

In terms of majority ownership, Figure 43 shows that between five and fifteen per cent of respondent businesses from the professional and scientific sector in Wales were majority owned by women between 2015 and 2018. This compares with 19 per cent across the UK as a whole in 2018.

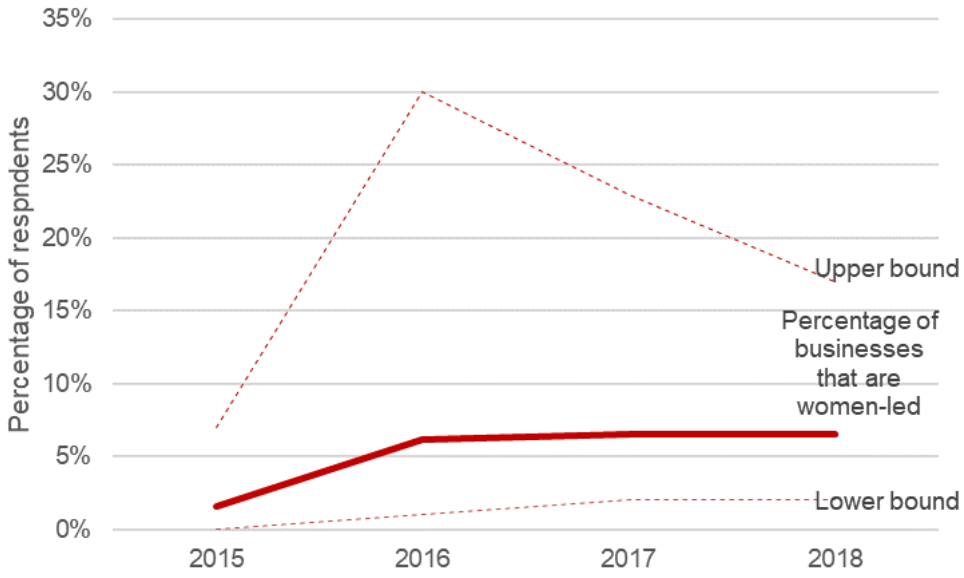
Figure 43.Percentage of small businesses in the STEM sector in Wales reporting they are majority-owned by women*



*Based on 27-58 respondents in the professional and scientific sector in Wales each year.
Source: Longitudinal Small Business Survey (2018)

Figure 44 shows that between one and six per cent of respondent companies from Wales in the STEM sector are women-led. This compares with an average of 16 per cent of companies across the UK in 2018.

Figure 44. Percentage of small businesses in the STEM sector in Wales reporting that their business is women-led



*Based on 27-58 respondents in the professional and scientific sector in Wales each year.
Source: Longitudinal Small Business Survey (2018)

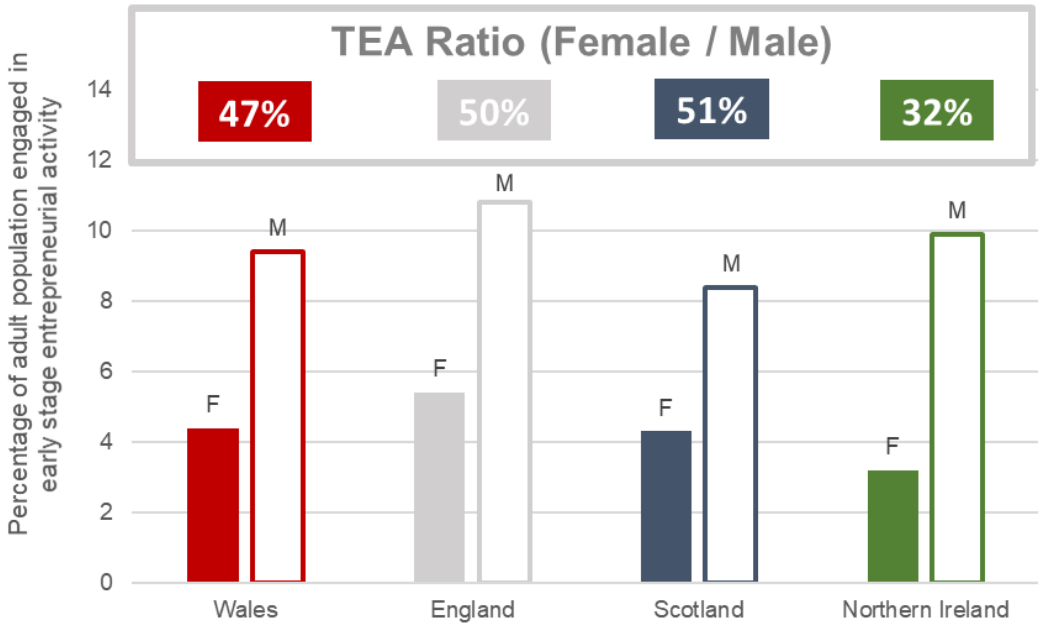
5.4 Entrepreneurship

The Global Entrepreneurship Monitor (GEM) undertakes an international Adult Population Survey which explores a range of questions relating to entrepreneurship. One of the survey's key indicators is the 'percentage of female 18-64 population who are either a nascent entrepreneur or owner-manager of a new business'. The GEM reports also divide this percentage of females by the equivalent for their male counterparts; this is known as the Female/Male Total early-stage Entrepreneurial Activity (TEA) ratio.[38] This data is available for each UK nation, but is not broken down by industrial sector.

The latest GEM UK 2018 Monitoring Report provides data on the above indicators for each UK nation.[39] The data in **Figure 45** show that:

- in Wales, 4.4 per cent of the female 18-64 population were either a nascent entrepreneur or owner-manager of a new business, compared with 9.4 per cent of males (giving a TEA ratio of 47 per cent);
- in England, the equivalent percentages were 5.4 per cent of females and 10.8 per cent of males, respectively (a TEA ratio of 50 per cent);
- in Scotland, the equivalent percentages were 4.3 per cent of females and 8.4 per cent of males, respectively (a TEA ratio of 50 per cent);
- in Northern Ireland, the equivalent percentages were 3.2 per cent of females and 9.9 per cent of males, respectively (a TEA ratio of 32 per cent).

Figure 45. Percentage of Male (M) and Female (F) population engaged in Total early-stage Entrepreneurial Activity (TEA) in the UK Nations, 2018



Source: GEM UK APS 2018.

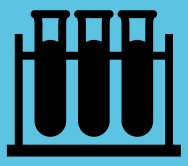
[38] A Female/Male TEA ratio of 100 per cent indicates an equal percentage of males and females, with a ratio below 100 indicating a lower level of entrepreneurship among females.
[39] Report available at: https://www.enterpriseresearch.ac.uk/gem-2018-report-launched/ [Accessed 10th December 2019]

In Wales, the percentage of the female 18-64 population who were either a nascent entrepreneur or owner-manager of a new business has increased from just over 4 per cent in 2002 to almost 7 per cent in 2018, fluctuating between four and eight per cent over this period.[40]

Key findings: Employment and the labour market

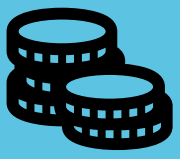
Employment

- There has been an increase in the number of females employed in **STEM occupations** in Wales.
  - However, **females remain under-represented** in STEM occupations. There are large variations by occupational sub-category.
    - 2018/19: **11,300 females** and **49,200 males** in STEM professional roles.
    - growth in the number of females in **senior IT roles** has been slower than among males.



Earnings

- The **STEM Gender Pay Gap (GPG) is closing in Wales** and the UK.
  - However, the gap is **greater in STEM occupations** than in other professions.
- Among larger companies, the GPG is **similar in STEM and non-STEM** sectors.



Enterprise and business

- Rates of **small business ownership** and **leadership** appear to be increasing among females in the STEM sector, albeit from a low base.
- Female **entrepreneurship** has increased in Wales between 2002 and 2018, though data on STEM sectors is not available.

[40] More detailed information for the UK (but not UK nations) is available in the GEM 2016/2017 Women's Entrepreneurship Report. This examines the following sector breakdown at UK level in 2016/17 only: Agriculture and Mining; Manufacturing and transportation; Wholesale/Retail; ICT; Government/Health/Education/Social Services; Finance/Professional/Administrative/Consumer Services.

Appendix 1

Additional tables drawn from the datasets upon which figures and tables in this report are based are presented below.

Comparing Foundation Phase data with other nations

In England, a gap of around two percentage points between girls and boys can be seen in Key Stage 1 Mathematics assessments. Table 23 shows that just over three quarters of girls (77 per cent) were working at the expected standard or above in 2019, compared with just under three-quarters (74 per cent) of boys.[41] Similar gaps in performance were seen in 2016, 2017 and 2018. Although the percentages of girls and boys working at the expected standard or above are lower in England than the percentages achieving the expected outcome in Wales, differences in the education systems mean that the data are not directly comparable.

Table 23. Key Stage 1 Mathematics assessments in England 2016-19

Percentage working at expected standard or above	2016	2017	2018	2019*
Girls	74%	76%	77%	77%
Boys	72%	74%	75%	74%

*Provisional data

Unlike in Wales, pupils are also assessed in Science in England at Key Stage 1. In 2019, 85 per cent of girls were 'reaching the expected standard' in Science compared with 80 per cent of boys. Assessments of younger children aged 5 are also undertaken in England, with data gathered through the 'early years foundation stage profile' on the percentage of 5-year-olds achieving at least the expected level in 17 early learning goals, which include 'numbers', 'shape, space and measures' and 'technology'. Data for 2018 illustrate that 5-year old girls perform better than boys in reaching each of these goals.[42]

Data for Scotland are not directly comparable to Wales, as assessments are undertaken at different ages, and are based on Numeracy rather than Mathematics. Numeracy assessments are undertaken in Primary 4 (P4) in Scotland (equivalent to Year 4 in Wales).[43] At this stage, a slightly higher percentage of girls (77 per cent) compared to boys (76 per cent) achieve the expected Curriculum for Excellence (CfE) levels in Numeracy in Scotland.[44]

[41] See *Phonics screening check and key stage 1 assessments: England 2019,* Department for Education. Available at: https://www.gov.uk/government/statistics/phonics-screening-check-and-key-stage-1-assessments-england-2019 [Accessed on 3rd December 2019]
[42] See *Early years foundation stage profile results in England, 2018.* Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/748814/EYFSP_2018_Main_Text.pdf [Accessed on 3rd December 2019]
[43] Foundation Phase assessments are undertaken in Year 2.
[44] See *Achievement of Curriculum for Excellence levels: 2018*-19. Available at: https://www.gov.scot/publications/achievement-curriculum-excellence-cfe-levels-2018-19/

Table 24. Primary 4 Numeracy assessment results in Scotland 2015/16 to 2018/19

Percentage achieving the expected CfE levels in Numeracy	2015/16	2016/17	2017/18	2018/19
Girls	74	76	77	77
Boys	72	74	75	76
Gap	2	2	2	1

Key Stage 1 Mathematics assessments are also undertaken in Northern Ireland, although the data is less comprehensive and reliable than in Wales, England and Scotland because of low completion rates from schools in some years as well as the sample data being unweighted. The most recently published data for Northern Ireland (2018/19) show that a higher percentage of boys (17.0 per cent) than girls (14.5 per cent) achieve Level 3 in Mathematics in Key Stage 1, with a higher percentage of girls (74.3 per cent) than boys (70.5 per cent) achieving Level 2. Similar patterns are seen in data for earlier years in Northern Ireland, with a higher percentage of boys achieving Level 3, and a higher percentage of girls achieving Level 2.[45]

Comparing Key Stage 2 data with other nations

In England, the percentage of boys and girls achieving the expected standard in Mathematics at Key Stage 2 increased between 2016 and 2019, with girls marginally out-performing boys in each year from 2017 onwards. Table 25 shows that 79 per cent of girls in England achieved the expected standard in Mathematics at Key Stage 2 in 2019, compared with 78 per cent of boys.[46]

Table 25. Percentage of boys and girls in England achieving the expected standard in Mathematics at Key Stage 2

	2016	2017	2018	2019
Boys	70%	74%	75%	78%
Girls	70%	75%	76%	79%

Source: National curriculum assessments at key stage 2

Compared with Mathematics, a larger gap is apparent between the boys and girls in Key Stage 2 Science assessments in England. The gap in the percentage of girls and boys achieving the expected standard widened between 2016 and 2019.

Table 26. Percentage of boys and girls in England achieving the expected standard in Science at Key Stage 2

	2016	2017	2018	2019
Boys	79%	79%	80%	80%
Girls	83%	84%	85%	86%

Source: National curriculum assessments at key stage 2

[45] See *Key Stages 1 and 2 Assessment Statistics.* Available at: http://ccea.org.uk/more/research_statistics/curriculum/key_stages_1_2/assessment
[46] See *National curriculum assessments at key stage 2.* Available here: https://www.gov.uk/government/collections/statistics-key-stage-2#pupil-attainment-at-key-stage-2

Data for Scotland are not directly comparable to Wales, as assessments are undertaken at different ages, and are based on Numeracy rather than Mathematics.[47] Numeracy assessments are undertaken in Primary 7 (P7) in Scotland (equivalent to Year 7 in Wales). Nevertheless, a similar gender gap to Wales in attainment can be seen in Scotland, with 78 per cent of girls and 75 per cent of boys achieving expected Curriculum for Excellence levels in Numeracy in 2018/19.[48]

Table 27. Percentage of boys and girls in Scotland achieving the expected standard in Numeracy at Primary 7

	2016	2017	2018	2019
Boys	67%	69%	73%	75%
Girls	69%	71%	76%	78%

Source: Achievement of Curriculum for Excellence levels, Scottish Government.

Key Stage 2 Mathematics assessments are also undertaken in Northern Ireland, although the data is less comprehensive and reliable than in Wales, England and Scotland because of low completion rates from schools in some years and the sample data are unweighted. The most recently published data for Northern Ireland (2018/19) show that a higher percentage of girls than boys achieve higher levels (Levels 4 or 5) in Mathematics in Key Stage 2, and that this has been true in each year since 2015/16.49 Key stage assessments in 'Using ICT' are also undertaken in Northern Ireland, but not in Wales.

GCSE entries

Table 28 shows the number of GCSE entries that were from boys and girls in STEM academic subjects in each year from 2012/13 to 2018/19. It shows that notably more boys than girls entered Applied Science, Other Sciences, Design and Technology, and ICT examinations in each year for which data is available.

[47] Key Stage 2 assessments are undertaken in Year 6 in Wales.
[48] See *Achievement of Curriculum for Excellence levels: 2018*-19. Available at: https://www.gov.scot/publications/achievement-curriculum-excellence-cfe-levels-2018-19/
[49] See *Key Stages 1 and 2 Assessment Statistics.* Available at: http://ccea.org.uk/more/research_statistics/curriculum/key_stages_1_2/assessment

Table 28. Number of entries for GCSE examinations in STEM academic subjects 2012/13 - 2018/19

Subject	2012/13		2013/14		2014/15		2015/16		2016/17		2017/18		2018/19	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
All Subjects	132830	138951	126038	132831	121920	129710	118970	125722	134660	139145	134763	137773	139348	142771
Biological Sciences	2953	2706	3051	2902	2914	2708	3035	2863	3091	3054	3314	3457	3460	3600
Chemistry	2906	2599	3056	2879	2896	2607	3016	2855	3067	3033	3254	3430	3433	3578
Physics	2919	2544	3027	2807	2892	2605	2980	2753	3045	2941	3290	3381	3361	3435
Single Science	10645	10625	9076	9293	8513	9014	8415	8702	10325	10178	.	.	.	.
Science (Double Award)	.	.	.	.	.	.	.	.	.	.	19955	19097	20094	19650
Applied Science	.	.	.	.	.	.	.	.	.	.	288	177	413	300
Additional Science	7079	7326	5898	6206	5698	6229	5708	6177	7595	7705	.	.	.	.
Other Sciences	496	141	540	120	537	132	565	101	393	61	256	48	25	7
Design & Technology*	5774	2979	5784	2789	5315	2714	5007	2536	4653	2285	4011	1642	3377	1469
ICT	2657	1814	3063	1982	3908	2038	4345	2198	5035	2179	4919	2084	5293	2165
Home Economics	277	3323	218	2728	257	2531	238	2570	184	2140	659	2893	709	2882
Mathematics	19240	18641	18374	17777	17677	17194	16974	16327	15968	15291	15254	14538	15562	14930
Mathematics - Numeracy	.	.	.	.	.	.	.	.	15528	14931	15036	14359	15292	14748

*Design and Technology is referred to as Craft, Design and Technology in Welsh Government statistics

Green text denotes that more than 55% of entries were from girls. **Orange text** denotes that more than 55% of entries were from boys.

Data for years prior to 2012/13 not shown for presentational reasons.

Table 29 shows the percentage change in the number of GCSE entries by individual subject between 2008/09 and 2018/19.

- The data show that there have been increases between 2008/09 and 2018/19 in the numbers of pupils undertaking
    - Biological Sciences (increase of 62 per cent),
    - Chemistry (increase of 69 per cent) and
    - Physics (66 per cent).
- This may be a reflection of fewer schools offering other Key Stage 4 courses such as BTEC in Science in recent years, and other changes in the subjects offered.
    - For example, from 2017/18 onwards, the data show a shift away from pupils entering Single Science and Additional Science GCSE (35,803 entries in 2016/17, zero in 2017/18), with many of these pupils entering Science (Double Award) and Applied Science instead (no entries in 2016/17, 39,517 in 2017/18).

As noted above, data showing changes over time in the number of entries for GCSE examinations should be treated with some caution, given changes in data collection methods and other patterns in the types of courses offered by schools. This is particularly the case with individual subject-level data. However, it is notable from Table 29 below that:

- the percentage increases in the number of entries for Biological Sciences, Chemistry and Physics GCSEs are higher among girls than boys;
- the number of entries for ICT GCSEs has halved among girls between 2008/09 and 2018/19, while remaining broadly unchanged for boys;
- the percentage increase in the number of entries for Home Economics is higher among boys than girls

Table 29. Percentage change in number of GCSE entries by subject 2008/09 - 2018/19

Subject or grouping		Percentage change 2008/09 - 2018/19		
		Boys	Girls	Pupils
All subjects		-5.5%	-8.5%	-7.0%
STEM Academic	Biological Sciences	56.1%	67.2%	61.6%
	Chemistry	62.4%	76.4%	69.3%
	Physics	57.6%	74.0%	65.5%
	Other Sciences	-95.9%	-95.2%	-95.8%
	Design & Technology*	-56.4%	-65.1%	-59.5%
	ICT	-0.5%	-51.1%	-23.5%
	Home Economics	90.1%	-23.9%	-13.6%
	Mathematics	-19.2%	-22.2%	-20.7%
Social Sciences	Business Studies	-17.3%	-30.6%	-23.1%
	Geography	-37.5%	-34.2%	-36.1%
	Humanities	-81.8%	-77.9%	-79.7%
	Social Studies	-96.1%	-95.9%	-96.0%
	Applied Business (VQ)	-97.4%	-97.4%	-97.4%
Other Academic	History	-30.5%	-15.9%	-23.1%
	Vocational Studies	-99.9%	*	-99.9%
	Art & Design	-32.0%	-5.7%	-15.7%
	Classical Studies	-90.6%	-95.7%	-92.9%
	Communication Studies	-55.9%	-60.1%	-58.1%
	Drama	-45.7%	-49.3%	-48.1%
	English Language	-10.9%	-14.7%	-12.8%
	English Literature	-11.3%	-15.2%	-13.3%
	French	-64.2%	-56.9%	-59.7%
	German	-71.3%	-72.1%	-71.8%
	Spanish	-20.5%	-19.8%	-20.1%
	Other Modern Foreign Languages	-12.1%	-13.1%	-12.6%
	Music	-45.2%	-30.3%	-37.1%
	Physical Education	-26.0%	-22.0%	-24.5%
	Religious Studies	36.7%	20.3%	26.8%
	Welsh	7.5%	-0.8%	3.0%
	Welsh Literature	-7.1%	-10.5%	-9.0%
	Welsh Second Language	125.6%	88.2%	105.0%
STEM Vocational	Applied Science (VQ) (8)	-0.9%	-29.4%	-16.1%
Other Vocational	Health & Social Care (VQ) (8)	-42.6%	-33.5%	-33.9%
	Hospitality & Catering (VQ) (8)	-73.0%	-64.6%	-67.8%
	Leisure & Tourism (VQ) (8)	-96.2%	-96.9%	-96.6%
	Performing Arts (VQ) (8)	-96.8%	-85.6%	-88.3%

*Design and Technology is referred to as Craft, Design and Technology in Welsh Government statistics
Green and **Orange** text denotes subjects where the percentage increase/decrease was over 10 percentage points higher/lower among **girls** or **boys**. Some subjects are not included above as they were no examination entries in 2008/09 or 2018/19. These are: Single Science, Science (Double Award), Applied Science, Additional Science, Mathematics – Numeracy, Economics, English Second Language, Applied Engineering (VQ), Applied ICT (VQ), Applied Science (VQ), Additional Applied Science (VQ), Construction (VQ), Manufacturing (VQ), Applied Art & Design (VQ), Applied PE (VQ), Media: Communication & Production (VQ).

ITE data

Table 30 below shows the number of first year students from Wales (Welsh-domiciled students) who enrolled onto ITE courses at HEIs in Wales and at HEIs across the UK in 2017/18.

Table 30. Number of enrolments by Welsh domiciled students on ITE courses in Wales and the UK by subject and gender 2017/18

Subject	Number of First Years from Wales on ITE courses in the UK by subject and gender			Number of First Years from Wales on ITE courses at HEIs in Wales by subject and gender		
	Females	Males	Total	Females	Males	Total
Business	5	5	10	5	5	10
Physics	5	20	25	5	10	15
Chemistry	15	10	30	10	10	20
IT	10	20	30	10	10	20
RE	25	5	30	*	20	20
Biology	25	20	40	15	15	30
DT	30	10	40	10	25	40
Geography	25	15	45	10	10	20
History	25	30	55	25	10	40
PE	25	35	60	30	15	45
Mathematics	45	40	85	20	30	50
General Science	*	5	5	*	5	*
Social Studies	*	*	5	*	*	*
All	260	390	650	175	260	435

Source: HESA Student Record

Registered teachers and practitioners

Table 31 below shows the number of registered male and female secondary teachers according to the subject in which they were trained. It shows that, in each of the last three years, the subjects in which females accounted for over 55 per cent of teachers trained were Biology, Combined/General Science, Geology, Mathematics and Chemistry. The subjects in which males accounted for over 55 per cent of teachers trained were Computer Science & Information Technology, Design Studies, Physical Science and Physics.

Table 31. Number of school teachers registered with EWC by ITE subject trained and gender (secondary trained school teachers only)

Subject Trained*	2017			2018			2019					
	Female	Male	Total	Female	Male	Total	Female		Male		Total	
	%	%	%	%	%	%	No.	%	No.	%	No.	%
Biology	63%	37%	100%	65%	35%	100%	411	65%	219	35%	630	100%
Chemical Engineering	50%	50%	100%	50%	50%	100%	1	50%	1	50%	2	100%
Chemistry	57%	43%	100%	57%	43%	100%	285	59%	198	41%	483	100%
Combined / General Science	61%	39%	100%	61%	40%	100%	467	61%	304	39%	771	100%
Computer Science & Information Technology	39%	61%	100%	38%	62%	100%	164	38%	273	63%	437	100%
Design & Technology	51%	49%	100%	51%	49%	100%	426	52%	392	48%	818	100%
Design Studies	35%	65%	100%	38%	62%	100%	83	38%	134	62%	217	100%
Geology	60%	40%	100%	56%	44%	100%	4	57%	3	43%	7	100%
Materials Science	50%	50%	100%	50%	50%	100%	1	50%	1	50%	2	100%
Mathematics	57%	44%	100%	58%	42%	100%	956	59%	677	42%	1,633	100%
Physical Science	29%	71%	100%	33%	67%	100%	4	29%	10	71%	14	100%
Physics	26%	74%	100%	25%	76%	100%	84	27%	223	73%	307	100%
Total: STEM Subjects	53%	47%	100%	54%	46%	100%	2,886	54%	2,435	46%	5,321	100%
Total: Other Subjects	**75%**	26%	100%	**74%**	26%	100%	6,796	**73%**	2,542	46%	9,338	100%
Combined Total	**66%**	**34%**	**100%**	**66%**	**34%**	**100%**	**9,682**	**66%**	**4,977**	**34%**	**14,659**	**100%**

*Subject trained data is based on the first subject recorded on the Register only. There are a small number of unknowns each year which total as follows: 2017 – 96, 2018—145 and 2019—148.

Source: EWC Register of Educational Practitioners

Table 32 below shows the number of registered male and female secondary teachers according to the subject in they teach. It shows that, in each of the last three years, the subjects in which females accounted for over 55 per cent of teachers were Biology, , Mathematics and Chemistry. The subjects in which males accounted for over 55 per cent of teachers trained were Information Technology, Physics, Engineering and Electronics.

Table 32. Number of school teachers registered with EWC by subject taught (middle or secondary phase working only) and gender

Subject Taught**	2017			2018			2019					
	Female	Male	Total	Female	Male	Total	Female		Male		Total	
	%	%	%	%	%	%	Number	%	Number	%	Number	%
Biology	66%	34%	100%	65%	35%	100%	290	66%	152	34%	442	100%
Chemistry	61%	39%	100%	60%	40%	100%	254	60%	168	40%	422	100%
Design & Technology	50%	50%	100%	52%	48%	100%	435	53%	386	47%	821	100%
Electronics	6%	94%	100%	13%	87%	100%	1	7%	13	93%	14	100%
Engineering	21%	79%	100%	20%	80%	100%	7	32%	15	68%	22	100%
Information Technology	42%	58%	100%	43%	57%	100%	269	41%	392	59%	661	100%
Mathematics	58%	43%	100%	58%	42%	100%	928	59%	656	41%	1,584	100%
Physics	36%	64%	100%	38%	62%	100%	137	37%	233	63%	370	100%
Science	55%	45%	100%	55%	45%	100%	677	56%	529	44%	1,206	100%
Total: STEM Subjects	53%	47%	100%	54%	46%	100%	2,998	54%	2,544	46%	5,542	100%
Total: Other Subjects	**76%**	24%	100%	**76%**	24%	100%	6,928	**74%**	2,417	26%	9,345	100%
Combined Total	**67%**	**34%**	**100%**	**67%**	**33%**	**100%**	**9,926**	**67%**	**4,961**	**33%**	**14,887**	**100%**

**Subject(s) taught - registered school teachers are included more than once if more than one subject taught is recorded on their record. No subject taught data is held for headteachers and therefore registered headteachers in secondary and middle schools are not included.

Source: EWC Register of Educational Practitioners

Table 33 shows that a fifth (20 per cent) of registered STEM subject practitioners in WBL providers were female, compared with almost three-quarters (73 per cent) in other subject areas.

Table 33. Number of work-based learning practitioners registered with EWC in a work-based learning establishment by subject supported

Subject Taught	Female		Male		Total	
	Number	%	Number	%	Number	%
Design and Technology	1	100.00	0	0.0%	1	100.0%
Engineering	4	3.9%	98	96.1%	102	100.0%
Geography and Environmental Studies	9	52.9%	8	47.1%	17	100.0%
ICT	21	61.8%	13	38.2%	34	100.0%
Mathematics	4	30.8%	9	69.2%	13	100.0%
Science	5	17.2%	24	82.8%	29	100.0%
Total for STEM subjects	**44**	**22.4%**	**152**	**77.6%**	**196**	**100.0%**
Total for Other subjects	**843**	**73.2%**	**309**	**26.8%**	**1,152**	**100.0%**
Combined Total	**887**	**65.8%**	**461**	**34.2%**	**1,348**	**100.0%**

Based on 999 work-based learning practitioners currently in-service (those currently employed by a work-based learning institution).
Data contains:
773 work-based learning practitioners have 1 subject recorded, 153 work-based learning practitioners have 2 subjects recorded, 43 have 3 subjects recorded, 20 have 4 subjects recorded, 6 have 5, 2 have 7 and 2 have 8.
Source: EWC Register of Educational Practitioners

HEI learners

Table 34. Percentage of students enrolling on HE STEM courses at HEIs in Wales who are female.

Country/Year	Percentage of students enrolling on STEM-related courses who were female				
	2013/14	2014/15	2015/16	2016/17	2017/18
Wales	46.0%	46.0%	48.2%	48.7%	49.9%
England	50.5%	50.8%	51.1%	51.5%	51.8%
NI	52.0%	51.6%	51.7%	52.2%	52.9%
Scotland	51.6%	51.5%	52.2%	52.6%	53.0%

Note: data are based on the country in which students study, rather than where they are domiciled
*STEM courses based on HESA's 'science subject area' definition.
Source: HESA Student Record

Table 35. Percentage share of Welsh-domiciled students on STEM and non-STEM courses at HEIs across the UK by gender

Subject and gender	Percentage share of Welsh-domiciled students on STEM and non-STEM courses by gender		
	2016/17	2017/18	2018/19
STEM courses - males	48%	47%	46%
STEM courses - females	52%	53%	54%
Non-STEM courses - males	35%	36%	35%
Non-STEM courses - females	65%	64%	65%

*STEM courses based on HESA's 'science subject area' definition.

Source: HESA Student Record

HEI workforce data

Table 36. Staff teaching in Welsh at Welsh Universities in Full-Person Equivalents (FPE) by cost centre and gender

Subject and gender – Male (M) and Female (F)	2010/11		2011/12		2012/13		2013/14		2014/15		2015/16		2016/17		2017/18	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
STEM cost centres*	2710	1630	2805	1730	3025	1965	3085	2060	3230	2245	2965	2085	3160	2295	3260	2350
Other cost centres	2165	2010	2165	2115	2280	2295	2515	2490	2405	2520	2235	2380	2320	2475	2230	2405

*HESA 'Science related' cost centre used as proxy for STEM

Source: HESA