November 2024

STEM Skills in Scotland: An Enginuity Report

Part 1: Scotland's Future STEM Workforce

Enginuity

The Enginuity ALLIANCE

Scotland needs a skilled workforce to meet future demand

Scotland is undergoing significant economic changes owing to global trends, technological advances, and a strong commitment to sustainable development. Economically significant industries for the country such as renewable energy, oil and gas, and advanced engineering with projects including the commissioning of five additional Type 26 destroyers in Glasgow are driving these changes now, and are key to the country's innovation, sustainability, and economic strategies for the future.

Scotland's ambitious environmental agenda and potential to become a global leader in sustainable energy will see the roles of renewables and oil and gas shift dramatically in the coming years. Meanwhile, advanced engineering supports these key industries by driving technological innovation and problem solving in sustainability. This is underpinned by the creation of the Energy Transition Zone (ETZ) in Northeast Scotland, and the work of the National Manufacturing Institute of Scotland (NMIS).

But these changes also bring challenges. There is a growing need for a skilled workforce that can not only support today's sector, but meet the future demands of evolving industries and key infrastructure projects in areas such as transport decarbonisation and domestic heating. In order to align workforce skills to industry demand and keep Scotland competitive, the education and skills system must not only equip students with the necessary technical skills, but adopt continuous learning and remain adaptable to future changes.

This three-phase research series will examine the long-term projections for workforce requirements in Scotland's renewable energy, offshore oil and gas, and advanced engineering industries. It will consider government policy, industry forecasts, and academic research to offer a comprehensive view of Scotland's projected workforce landscape, supply and demand in the skills system, and educational requirements up to 2035.

The research will also explore strategies for the education and skills system to adapt to changing needs and ensure that Scotland's workforce is well-equipped to drive sustainability and future economic growth.

Phase 1: Scotland's future STEM workforce

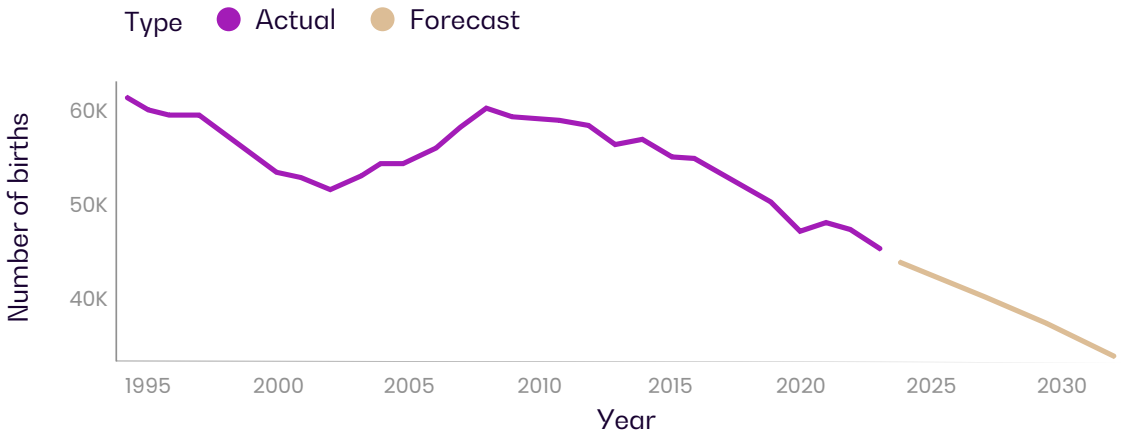
This first phase of research explores the availability of school leavers in Scotland to join the workforce or enter full time further or higher education in the next 5–10 years.

It will then analyse how many school leavers are opting for STEM based activities, and assess the number of young people available to work in future engineering-related jobs. Part of this analysis will examine how changes to the maths and physics curriculum are affecting the uptake of STEM-based careers among school leavers.

Birth rates and post-school activities: A complex picture

Despite a brief increase between 2002 and 2008, figure 1 shows Scotland's birth rate in significant decline, with 45,063 reported births in 2023 marking a 4.03% drop on the previous year, and a 20.55% fall in the ten years since 2014[1].

Figure 1: Births with forecasted values



This decline correlates with the falling number of young people entering higher or further education[2], as shown in figure 2.

This gradual fall in enrolment numbers was mirrored for modern apprenticeship pathways and full-time employment (figure 3), which were in steady decline up until 2020, when a sharp increase was attributed to the Covid-19 pandemic[2][3].

Figure 2: Number of starts/enrolments in education (16–19 years old)

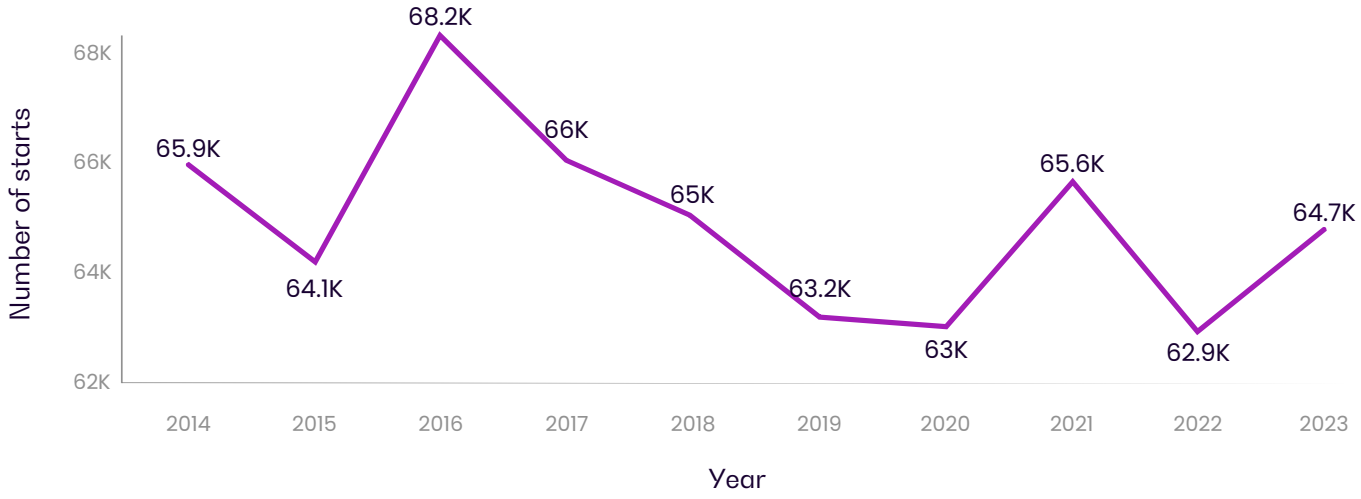
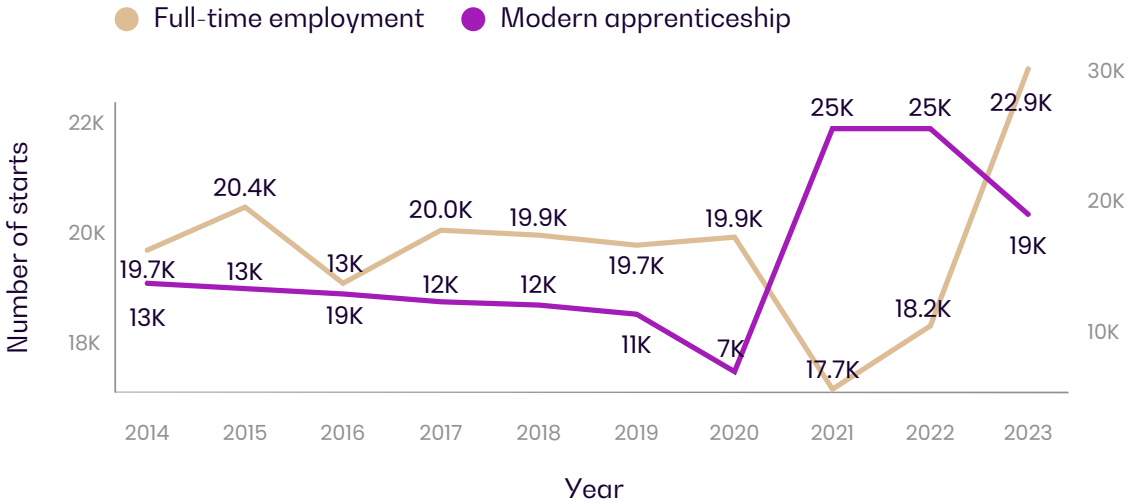


Figure 3: Modern apprenticeship pathways and full-time employment



Conversely, the data for those entering part-time employment, self-employment, and graduate apprenticeships (figure 4) differs from the birth rate data, showing a steady increase over time. The introduction of graduate apprenticeships with 277 enrolments in 2017 additionally saw a sharp increase to 1,177 in 2021[4].

The following data was collected from Skills Development Scotland to give a complete picture of how many young people are leaving school and beginning post-school activities (figure 5):

- 16-19 year-olds entering employment (full-time/part-time/self-employed)
- First-year enrolments into Further/Higher Education facilities
- 16-19 year-olds enrolling in apprenticeships (modern and graduate)

Figure 4: Part-time employment, self-employment and graduate apprenticeships

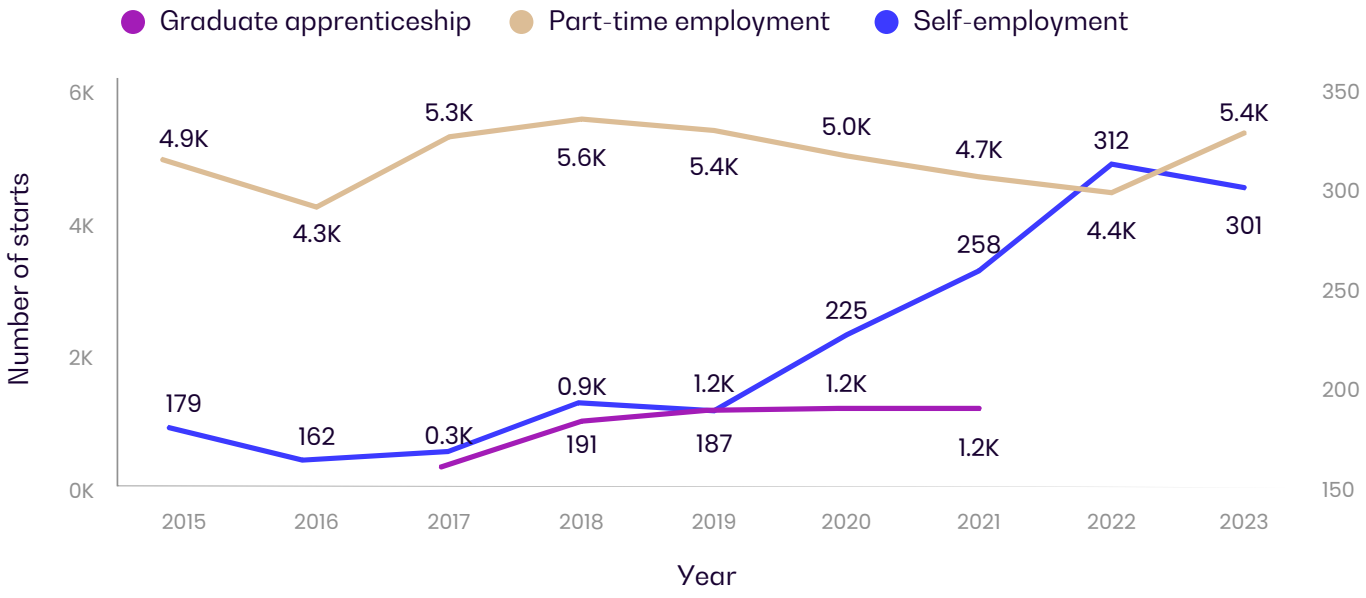
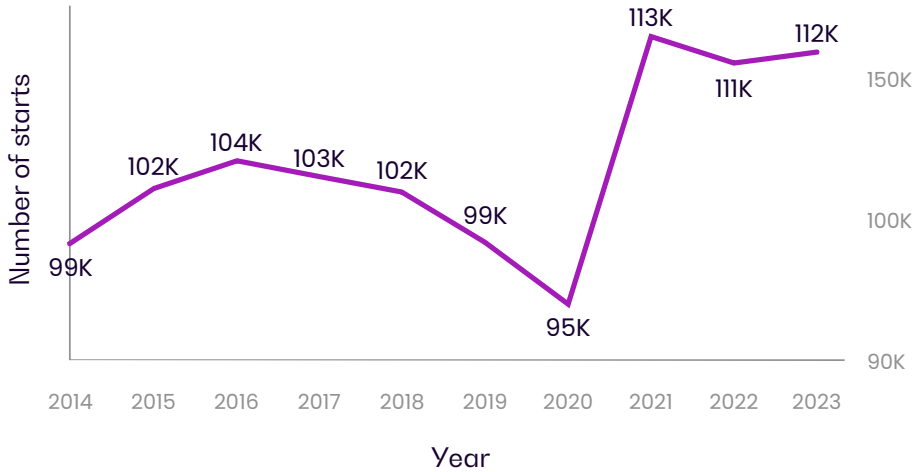


Figure 5: Total number of starts/enrolments



The total number of enrolments shows a convex curve between 2014 and 2020, followed by a rapid influx of around 113,000 students across Scotland in 2021[2][3][4]. 2021 also saw a record 183,025 students studying across all Scottish universities[5]. Reassuringly for the future, this level has held into 2022-23.

As predicted, those entering higher or further education accounted for the most enrolments in post-school activities, hitting more than 55% most years since 2014, while graduate apprenticeships accounted for the least (figure 6).

Figure 6: Total starts/enrolments and distribution

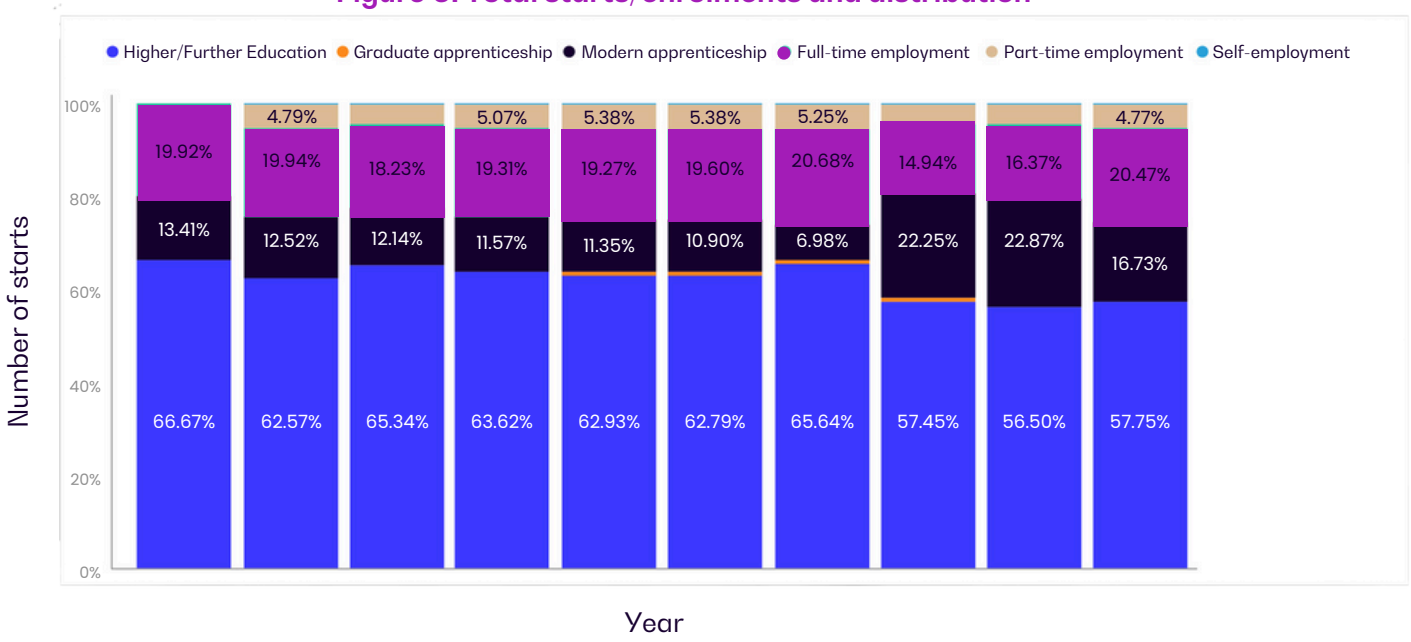
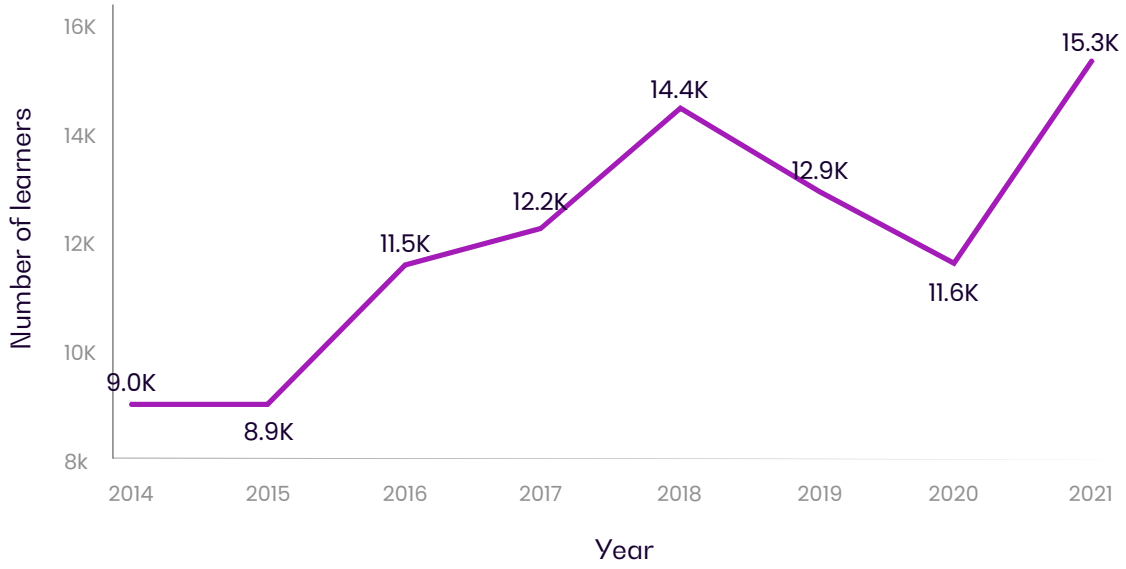


Figure 7: Total learners entering STEM (first year)



Learners, students and STEM: Dissecting the data

As part of this research, we broke down the definition of STEM to explain the apparent fall in entrants, as follows.

The Higher Education Statistics Agency classified the following as science-related subjects (not including apprenticeships):

- Medicine and dentistry
- Subjects allied to medicine
- Biological sciences
- Veterinary science
- Agriculture and related subjects
- Physical sciences
- Mathematical sciences
- Computer science
- Engineering and technology
- Architecture, building & planning
- Psychology
- Geography, earth and environmental studies (natural sciences)

Of these, the subjects relevant to careers in engineering are:

- Physical sciences
- Mathematical sciences
- Computer science
- Engineering and technology

For the purpose of this research, these four subjects are termed “engineering-related” (ER).

To better understand the popularity of these engineering-related subjects over time, the numbers of available first-year courses were monitored from 2014 to 2021 (figure 8).

Figure 8: STEM courses available in first year (engineering related)

A steady decline was observed over this period, with 24% fewer courses available to those interested in engineering-related subjects[6][7].

We would expect this decrease in supply to reflect a similar decrease in demand, shown by fewer young people enrolling in ER subjects. However, the two graphs below show the number of learners in non-ER and ER subjects as remaining relatively consistent (figures 9 and 10).

Figure 9: Total learners per STEM subject (engineering-related)

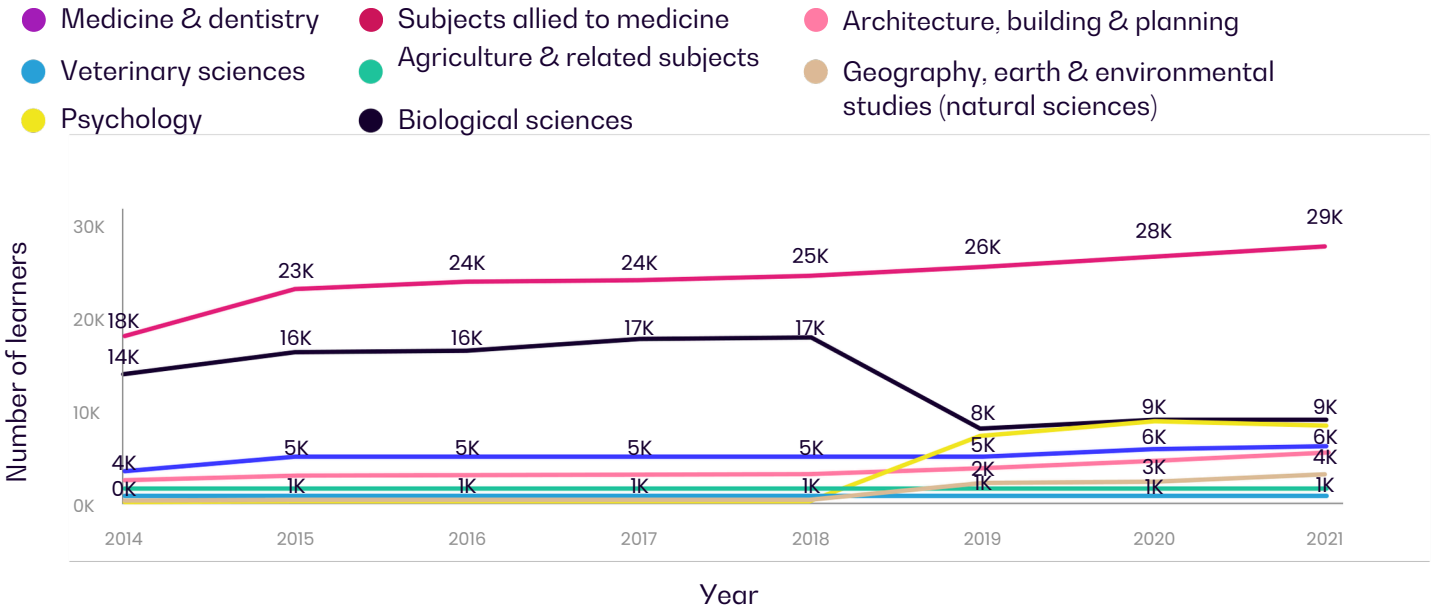
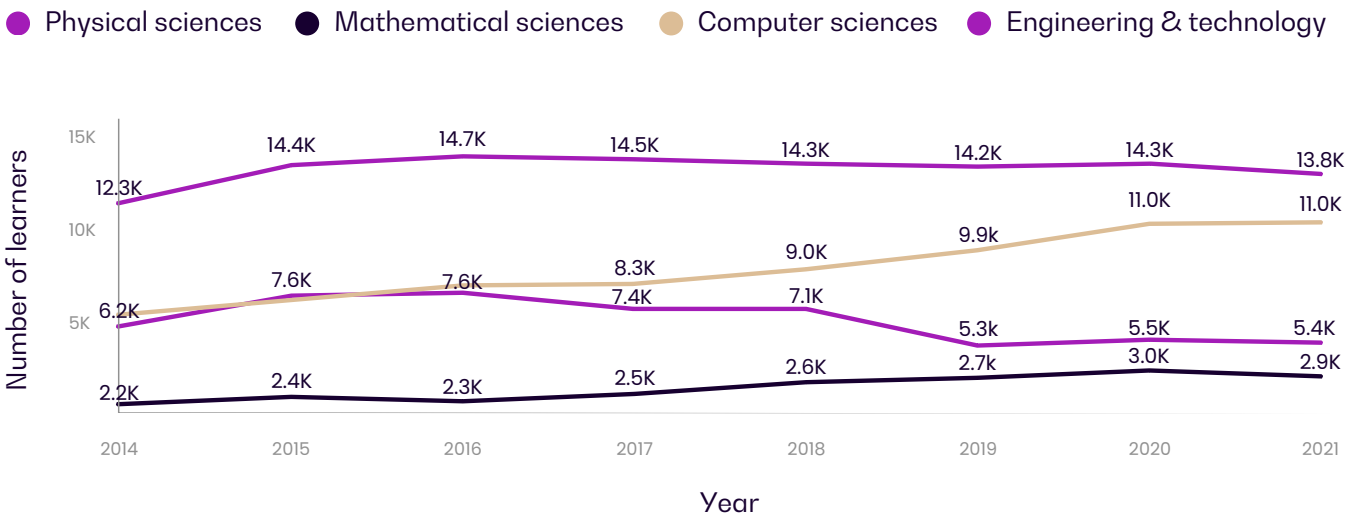


Figure 10: Total learners per STEM subject



The importance of change

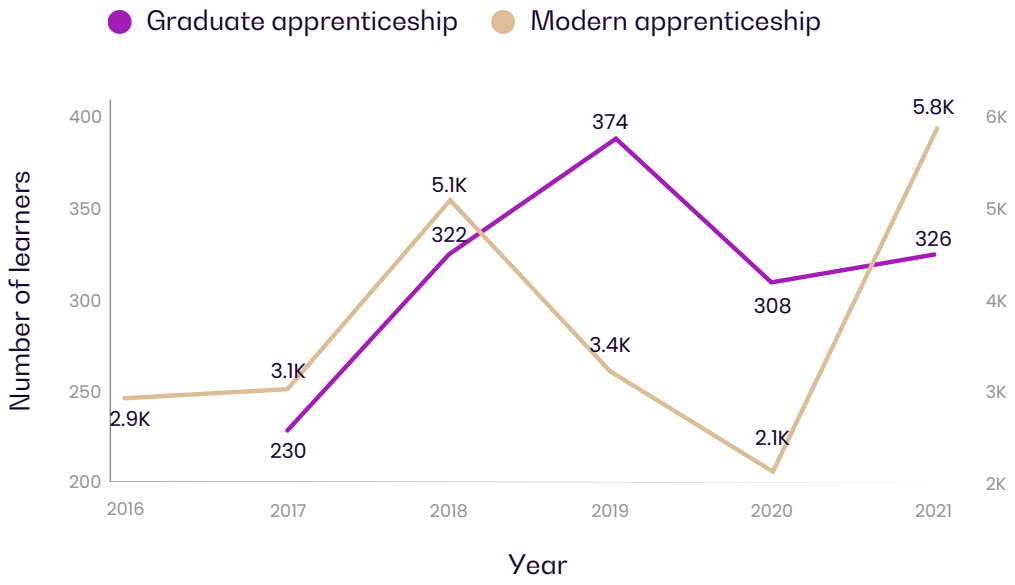
The data may appear consistent, but calculating the percentage of change for each subject between 2014 and 2021, as well as the total for all science subjects over time, reveals a different picture (figure 11).

Figure 11: Percentage of change between 2014 and 2021

Subject	% change
Veterinary science	120.65%
Agriclture & related subjects	77.17%
Medicine & dentistry	75.60%
Computer science	64.22%
Architecture, building & planning	60.30%
Total science subject areas	44.86%
Geography, earth & environmental studies (natural sciences)	32.66%
Mathmatical sciences	31.34%
Psychology	21.37%
Engineering & technology	11.99%
Physical sciences	-13.13%
Biological sciences	-37.56%

It is concerning to see that three-quarters of ER subjects, shown in purple, growing at a slower rate than the total for subjects across the STEM sector. The only ER subject in the blue is computer science, which is potentially attributable to a recent surge of interest in information technology. One ER subject – physical sciences – notably shows a negative change of -13.13% since 2014[6][7].

Figure 12: Total learners entering STEM apprenticeships



The percentage of change for ER apprenticeships is more positive, with an impressive 91.63% rise in modern apprenticeship enrolments since 2016. Since 2017, graduate apprenticeships have seen an increase of 41.74% (figure 12)[3][4].

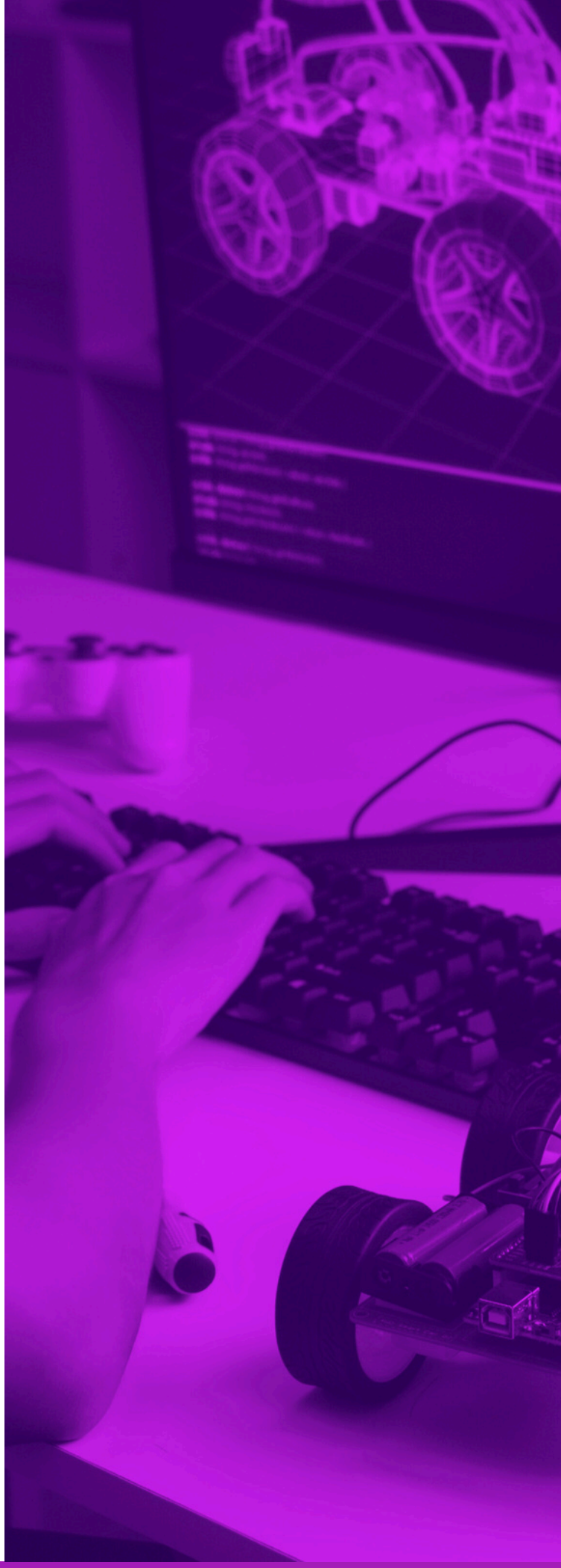
These increases in apprenticeship enrolments are encouraging, but they don't represent a sufficiently large contribution to sustain the workforce, and we believe this explains the diminishing supply of engineering-related workers. Although students and learners are entering STEM at a greater rate overall, they aren't pursuing engineering-related subjects in numbers sufficient to meet demand.

Conclusion

The shrinking availability of engineering-related STEM education programs, and post-16 learners' diminishing interest in fields such as engineering and physical sciences, is a concerning trend.

These learners' choices may result in stagnation or decline for crucial industries requiring engineering-related expertise and could impact worker availability for major transformation projects in the future. It is therefore imperative for Scotland's future economic ambitions that these challenges be addressed.

Revitalising interest and investment in STEM education is essential to ensuring Scotland's sustained growth in engineering and manufacturing, as well as overall long-term economic sustainability. That's why, as the charity dedicated to closing the UK's engineering and manufacturing skills gaps, Enginuity is working to provide the sector with the information it needs to make strategic choices for a successful future.



Enginuity

About Enginuity

Enginuity is a charity dedicated to helping employers find new ways to close the skills gap.

We combine a unique approach to sector data with a deep understanding of skills challenges to help employers ensure the sector has a highly skilled, globally competitive workforce now and in the future.

Enginuity.org

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