A CALL TO ACTION

Gender and Pathways into Engineering and Technology Summary of the Builds in Workshop 1 to the Context Setting Paper

Introduction

This paper is a summary of the builds in workshop 1 to the Context Setting – Gender and Pathways into Engineering and Technology paper. Collective wisdom in the room was shared through adding insights to a visual of the context setting paper and through lightening talks.

This paper should be read alongside the Context Setting – Gender and Pathways into Engineering and Technology paper and the Outputs from Workshop 1.

Context

We did some further work on the pathways into engineering and technology which reveals interesting differences across the nations as shared in Table 1 below, but we cannot infer causation from the patterns of uptake.

Table 1. Percentage of female entries for pathways into E&T by nation[1]

Subject and UK results	England	Scotland	Wales	Northern Ireland
Physics A-level/Highers	24.1% in 2025 (22.1% in 2018)	27% in 2025 (20% in 2018)	20.8% in 2025 (21.6% in 2018)	26.6% in 2025 (26.2% in 2018)
Maths A-level/Highers	37.2% in 2025 (39.2% in 2018)	46% (39% in 2018)	38.1% in 2025 (40.5% in 2018)	42.0% in 2025 (40.4% in 2018)
Computing A-Level – 18% females in 2024 (12% in 2018) in England, Northern Ireland and Wales	18.7% in 2025 (11.7% in 2018)	N/A	15.1% in 2025 (12.2% in 2018)	18.2% in 2025 (13.7% in 2018)
Computer science Scottish Higher	N/A	21% females in 2025 (14% in 2018)	N/A	N/A
Design and technology A-Level – 32% females in 2024 (37% in 2018) in England, Northern Ireland and Wales	33.1% in 2025 (37.8% in 2018)	N/A	32.7% in 2025 (33.5% in 2018)	27.6% in 2025 (28.7% in 2018)
Design and manufacturing Scottish Higher	N/A	33% females in 2025 (48% in 2018)	N/A	N/A

[1] the datasets can vary by nation, and in some cases are not completely like-for-like comparisons

Physics GCSE - 48.2% females 2024 (49% in 2018) in England, Northern Ireland and Wales	48.3% in 2025 (49.5% in 2018)	N/A	49.1% in 2025 (50.5% in 2018)	42.3% in 2025 (44.1% in 2018)
Physics National 5	N/A	28.2% in 2025 (28% in 2018)	N/A	N/A
Computing GCSE – 22.6% females in 2025 (20% in 2018) in England, Northern Ireland and Wales	22.8% in 2025 (20.4% in 2018)	N/A	16.2% in 2025 (13.4% in 2018)	18.4% in 2025 (13.4% in 2018)
Computer Science National 5 -	N/A	23% in 2024 (20% in 2018)	N/A	N/A
Engineering and technology-related vocational qualifications (not including T-Levels)	10.7% females 2022/23 (10.2% in 2021/22)	Currently unknown	Currently unknown	Currently unknown
Engineering and technology-related T-Levels in England	12% in 2024 (9% in 2023)	N/A	N/A	N/A
Engineering and technology-related apprenticeships in England	20% in 2025 (14% in 2020/21)	3.7% in 2022/23	8.8% in 2024/25 (full year all apprenticeships levels (10.7% in 2018/19)	2.8% in April 2024
Engineering and technology degrees across the UK – 19% females in 2024 (20% in 2018/19)	We are unable to calculate statistics for each nation, but in engineering and technology subjects in higher education (2023/24) there were: • 20.4% women in first degrees (compared to 60.1% for all other subjects)			

Societal Influences

The main build in this area from the workshop was in relation to discrimination. It was highlighted that sexism is the root of a number of issues. Misogyny is on the rise and this is influencing the behaviour of boys. Girls who fear sexual harassment will likely be put off from being in spaces dominated by boys[2]. Girls may actively be making the decision not to go into a career in what they perceive may be a toxic (sexist) male-dominated environment such as engineering. Women taking STEM degrees were significantly more likely to report experiencing sexism in their educational setting than those on non-STEM degrees, and this was highest in engineering and physics. Sexism was mostly attributed to male peers (ASPIRES[3]).

There was also a suggestion to consider more about the impact of social media and particularly social influencers.

[2] Review of sexual abuse in schools and colleges - GOV.UK, also see Everyone's Invited

[3] Aspires 3 - main, engineering-specific, and computing-specific reports

Educational Influences

The three builds from the collective in relation to educational influences were in reference to specialist teachers, the curriculum and the transition from primary to secondary.

Specialist teachers

The paper highlighted that non-specialist teachers are teaching STEM subjects, limiting students' opportunities to engage deeply with and be inspired by these subjects. To build this point further it was highlighted that industry is more appealing for specialists to work in from a financial perspective compared with teaching, and this is especially true in tech roles.

Curriculum

The curriculum is too large, there is too much content to teach within the time available and as a result teachers have less space to teach in an impactful way and bring enrichment into the curriculum, for instance through careers-related content or hands-on and/or project-based learning. This was found to be a particular challenge at Key Stage 4 in England, Wales and Northern Ireland where 73% of respondents said the amount of content was a challenge across all sciences[4].

Transition

There is a decrease in interest in STEM in the transition between primary and secondary school. Students go from cross-curricular teachers to subjects being separate, and they may find it harder to see the links across the curriculum.

Personal Influences

The collective didn't have any specific builds on this area of the report.

What might work?

Practice: Interesting Spaces

Equitable approaches to informal (out of school) STEM engagement

- Tools and resources focused on understanding and supporting equitable practice in informal STEM learning were developed in the Youth Equity and STEM project (2017-2022). The materials were based on extensive mixed-method research with young people aged 11-14 and informal STEM learning practitioners, and were co-developed by a team of academic researchers and informal STEM learning organisations in the UK and the US. The tools support informal STEM learning professionals to reflect on and develop equitable practice. The equity

[4] Science teaching survey 2022 (Too much content to teach within the time available)

compass is a reflective framework for supporting equitable practice in informal STEM learning. Core equitable practice toolkits guide the design and enactment of informal STEM learning. It is supported by an outcomes framework for identifying and supporting equitable youth outcomes from informal STEM learning (The YESTEM Project). The project has published seven peer-reviewed papers detailing positive impacts of the approach among practitioners and youth, including how it supported a range of equitable youth outcomes[5] and critical reflection towards equitable practice among practitioners[6].

- The UCL-led Making Spaces project, conducted over four years with makerspaces from five countries, in which makerspace practitioners, youth co-researchers and UCL academics worked together to identify, develop and share equitable approaches that can support diverse young people to engage meaningfully with STEM. The 3-STEP Guidebook builds understanding of the issues and explains the three steps (Prepare-Do-Evaluate) that practitioners can take to develop more equitable and inclusive practice, providing practical case studies and exercises to help practitioners to put the ideas into practice. The impact and evaluation report is currently in production, but there is early evidence that the approach increased participation among girls and under-served communities and supported pathways into technology.

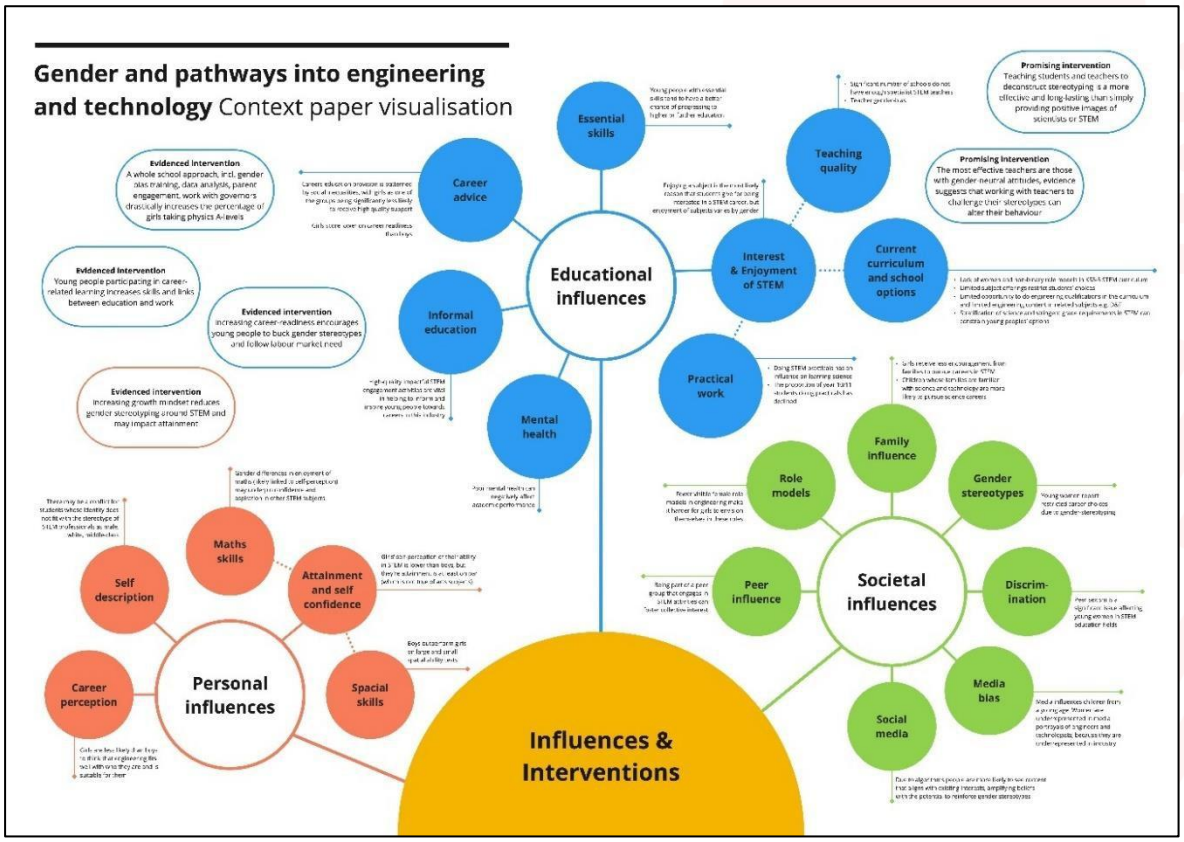
Linked Spaces That Need Attention

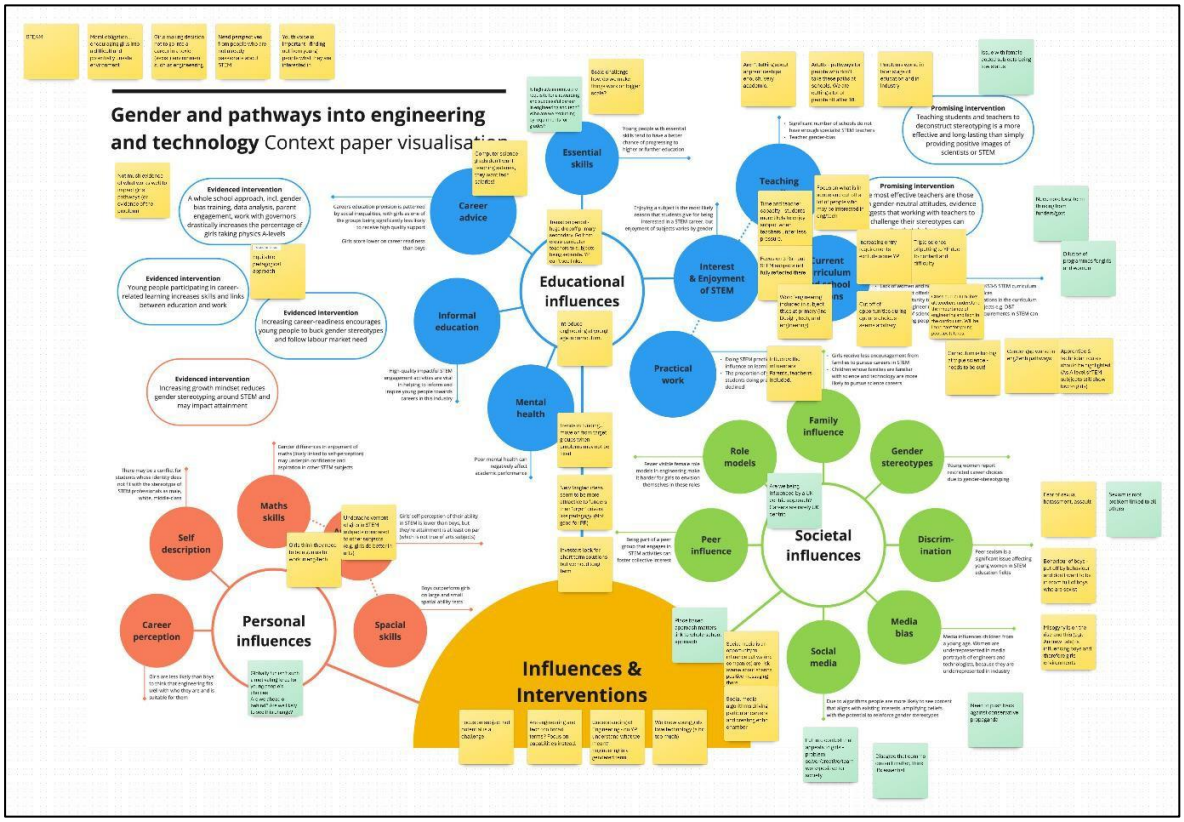
- We need to ensure that there is collective action to improve inclusion and the experience of women once they are in the workplace, not least to ensure it is ethical to drive more girls into the industry.
- Need to ensure we are maximising opportunities to encourage 18+ into the industry as well as focusing on 18 and under.

[5] Archer et al (2020): Changing the field: A Bourdieusian analysis of educational practices that support equitable outcomes among minoritized youth on two informal science learning programs - Archer - Science Education - Wiley Online Library

[6] Archer et al (2023): Full article: 'It really has made me think': Exploring how informal STEM learning practitioners developed critical reflective practice for social justice using the Equity Compass tool

Appendix 1


Gender and pathways into engineering and technology Context paper visualisation
Essential skills
Career advice
Teaching quality
Interest & Enjoyment of STEM
Current curriculum and school options
Educational influences
Informal education
Practical work
Mental health
Family influence
Role models
Gender stereotypes
Peer influence
Societal influences
Discrim-ination
Media bias
Social media
Maths skills
Self description
Attainment and self confidence
Career perception
Personal influences
Spacial skills
Influences & Interventions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Appendix 2

Louise Archer, Chair of Sociology of Education, UCL

- **Called for Change** - stressed the need for everyone to adopt new approaches and do things differently to foster real change, ensure work is driven by research and not based on the deficit model. Highlighted the importance of this as some current practices often lead to repeating the same patterns without significant change. However, acknowledged the difficulty in changing a deeply entrenched system.
- **Language and Injustices** - highlighted the issue of misogyny and sexism.
- **Collaboration** - pointed out that the existing STEM ecosystem focuses on competition rather than collaboration.
- **Ethical considerations** - questioned the value of encouraging more girls into an industry that isn't sufficiently supportive or inclusive, and the need to also focus elsewhere in the system to drive change.

Lynne Bianchi, Director of SEERIH, Manchester University

Progressing to be an engineer
Progressing to be an engineer: the approach

- **Curriculum** - explore how engineering can be integrated into the educational curriculum and identified and named the engineering habits of mind that are already present but not explicitly recognised and linked to the engineering discipline in the classroom, such as systems thinking, visualising, adapting, problem finding, creative problem solving, and improving.
- **Desirability and Awareness** - highlight the importance of making engineering desirable and addressing the lack of awareness about the industry.
- **Focus on Teaching**
    - Investment in primary teacher confidence is lacking, and training responsibilities are unclear.
    - Teachers often lack the understanding and experience to effectively teach and invigorate the curriculum.
    - There is a shortage of encouragement and recognition from senior management, not just resources.
- **Family Influences** – Importance of family influences on children's education and career choices.
- **Engineering for Social Benefit** - Link engineering education to social benefits and the Sustainable Development Goals (SDGs).

Katherine Ellis, Gender Inclusion Lead, STEM Learning

- Opportunity and Availability **are key drivers**
- **Maths** as a Prerequisite - requiring maths as a prerequisite for studying computing can be limiting.

- **Safe Learning Environment** - importance of providing a safe space for students to explore skills without the pressure of grades.
- **Inconsistent Career Provision** is a concern and leads to lack of awareness about progression routes in computing and related fields. Industry is reluctant to engage with younger age groups.
- **Support for Teachers** - need for Career Information and Guidance (CIG) for teachers, without overburdening them with responsibility.
- **Parental Involvement** - the importance of the role of parents in supporting their children's education and career choices.
- **I Belong** - initiative aimed at supporting more girls in computer science, highlights the importance of fostering a sense of identity and belonging among students.

Dawn Bonfield, Professor of Practice in Engineering for Sustainable Development, Kings College

'If you don't mind who gets the credit, you get a lot more done'

Importance of collective action and collaboration, the importance of working together and forfeiting ownership for greater impact.

Two main, connected, issues:

- **Pathways** - not enough girls entering engineering - due to insufficient role models, peer pressure, and inadequate career advice. There is a lack of pathways into post-16 science from double science, much higher association between triple science and science pathways.
- **Retention** - high attrition rates within the profession - improving retention through a more inclusive industry will also help attract more people to the profession.
- **Curriculum Review** – opportunity is now
- **Engagement with Interests** - integrating topics like climate change and social injustices to engage students. Share narratives of Magnificent Women.
- **Government and Funding Support** importance of government support and funding to implement systemic changes.
- **Structural Solutions** - internship opportunities, resources for schools and informal education providers. Also highlighted the importance of parents.

Becca Gooch, Head of Research, EngineeringUK

Science Education Tracker

- **Early Influences** - Various issues affect girls from a young age.
- **Interest and Confidence**: There's been a 10%p drop in interest in school science among girls in years 7-9 since 2019, creating a new gender gap. Enjoyment and self-perceived ability in science, maths, computing, and especially physics, are lower for girls, though this doesn't reflect their actual attainment.
- **Career Aspirations**: These factors impact career aspirations, with girls being half as likely to believe they could become an engineer if they wanted to.
- **Teaching Quality**: Good teachers can encourage girls to learn science, while bad teachers can discourage them, making teacher quality crucial.

- **Extracurricular Activities**: Outside school, girls are as likely as boys to visit science attractions but are much more likely to visit arts and culture.
- **Identity**: Plays a significant role in their choices.
- **Career Provision**: Effective career guidance can improve career readiness and mitigate biases. Girls with high career readiness are twice as likely to aspire to engineering careers (Careers Education 2022/23: Now & next | The Careers and Enterprise Company).
- **Universal Offering**: It's important to have universal career activities, as girls participate less in STEM-related activities compared to general career activities (Advancing STEM careers provision in England - EngineeringUK | Inspiring tomorrow's engineers).

Carol Davenport, Director, NUSTEM

- **Early Career Choices** - children start thinking about careers at a very young age (6-8 years old) and often make gendered choices based on their hobbies and direct experiences. Boys tend to aspire to physical sciences and engineering, while girls lean towards biological and healthcare roles. Early intervention is necessary to influence career aspirations positively.
- **Influence of Key Figures** - Families and teachers play a significant role in shaping children's career aspirations, often guiding them towards what is deemed appropriate for their gender. Families need support to understand how to help their children attain these careers, especially from a socio-economic perspective. Children rarely mention famous people as role models, preferring to emulate family members.
- **Supporting Girls in STEM** - To encourage girls in engineering and technology, it's crucial to show their families and communities that these are viable and appropriate careers.
- **Career Aspirations as a Process** - career aspirations develop over time and should be supported through exploration of various careers.
- **Career Information and Guidance** - Career guidance in schools should focus on career exploration rather than listing possible jobs. Providing skills and knowledge to explore pathways is essential.
- **NUSTEM's Approach** - NUSTEM integrates STEM career awareness into primary school workshops, helping children identify with STEM attributes and understand the breadth of STEM careers. Supporting teachers to link careers to classroom teaching is vital, aligning with the Gatsby benchmarks.
- **Moral Imperative for STEM Jobs** - Organisations must ensure that STEM jobs are genuinely good jobs, addressing retention and working conditions. Encouraging girls into STEM careers is futile if the industry cannot retain them due to workplace incompatibility.

Natasha Plaister, Statistician, FFT Education Datalab

- **Subject Choices** - Girls often don't choose the subjects that lead to engineering and tech careers, starting as early as GCSEs.
- **Early Decisions**: Early subject choices can limit options at KS5 (A-Levels). For instance, not taking GCSE computer science can make a difference at A-Level.

For example, 90% of A-Level computer science students took GCSE computer science, so by not choosing the subject at GCSE you may close off the possibility of taking A-Level. And, while for some it's not a choice, some pupils may choose not to take triple science GCSE, which can limit options at KS5.

- **Gendered Subjects**: At KS5, subjects that might lead into relevant careers, e.g. A-Level physics and computer science, and T-Levels in engineering and digital subjects, are among the most gendered.
- **Interest vs. Other Factors**: While some girls may not be interested in these careers, research suggests other factors, such as confidence and the feeling that girls need particularly high grades to pursue physics / computer science, play a role. We found that girls studying A-Level physics and computer science had exceptionally high grades compared to their male peers – the difference was larger than for any other A-Level subject.
- **Single-Sex Schools**: Girls in single-sex schools are more likely to choose A-Level physics, but this is largely down to differences in prior attainment and pupil characteristics, not the single-sex environment itself.

Rhys Morgan, Director, Royal Academy of Engineering

- **Voice in Government** - Engineering and technology sectors are among many groups seeking government attention. STEM fields are successfully gaining recognition and space. STEM overall does not have a gender problem, as more women are studying these subjects – need to be specific about engineering and technology.
- **Socio-Economic Factors** - Efforts to raise aspirations in poverty-stricken areas are ongoing, but there won't be an immediate government focus on women.
- **Education System Issues** - The education system has deep-rooted issues, and the government is focused on gradual reforms over radical changes – evolution not revolution.
- **Green Skills and Jobs** - The concept of "green skills" is seen as misleading and confusing, suggesting there is no distinct category for such skills.

Jessica Hamer, Manager, Institute of Physics

- **Under-Representation in Physics** - Physics has significant under-representation of girls, with only 23% at A-level and 21% in physics-related apprenticeships. All educational routes are important, as highlighted by Skills England.
- **Barriers to Participation** - Barriers are numerous and complex, varying across different subject areas. They include: school and classroom environment, culture and climate of the school, curriculum, availability of subject specialists.
- **Solution:** Whole School Equality Programme (WSEP): A structured, strategic approach where schools commit to addressing barriers across the entire school. The approach should be led by the Senior Leadership Team (SLT) and integrated into the school's ethos. Tailor the approach to each school's specific needs.
- **Rationale:** There is limited STEM-specific evidence for interventions that are known to work. The 2014-2016 Improving Gender Balance and Drayson Pilot Programme significantly increased the number of girls in physics across six schools. Addressing barriers requires systematic change across the whole

school environment, not just more role models or museum trips, although these are also important.

Anne-Marie Imafidon, CEO and Creator, STEMETTES

- **Equitable and Intersectional Practice** – importance of equitable practices that consider multiple intersecting identities.
- **Informal STEM Spaces** - importance of informal STEM spaces alongside formal educational settings.
- **Relevance and Iteration** - need for STEM initiatives to be relevant and iterative, adapting based on feedback, and taking an asset-based approach.
- **Youth Voice** - recognise the importance of incorporating youth perspectives to ensure relevance and continuous improvement.
- **STEAM Approach** - Promote the STEAM (Science, Technology, Engineering, Arts, and Mathematics) approach as central to innovation.
- **Enjoyment and Fun** - Acknowledge the significance of making STEM outreach enjoyable and fun to engage participants effectively.
- **Industry** – important to address the injustice of underrepresentation of women in influential STEM roles.

Julia Adamson, Managing Director, Education & Public Benefit, BCS, The Chartered Institute for IT

- **Gender Diversity as a Priority** - The recent BCS diversity report shows women are under-represented, underpaid, and sometimes made to feel unwelcome in tech fields. This underscores the urgent need for change.
- **Educational Pathways** – There are challenges across the system that need to be tackled including further education (FE), higher education (HE), and the workplace.
- **Where we are:**
    - 94% of girls choose not to pursue "tech" at the earliest opportunity
    - Lowest proportion of females amongst all subjects, 15% compared to Biology (64%) Chemistry (56%) Physics (23%).
    - 42.9% of top grades (A+) secured by students who attended independent schools compared with 20.6% who attended state sixth form.
    - Pass rates amongst female candidates in computer science (95.8%) higher than in all other science subjects (Chem 95.3% Phys 95.5% Biology 95.6%) and lowest amongst males.
    - 90k+ students in 2023 ~12.6% of cohort, compared to ~40% Geography (293k); ~26% Biology (191k); ~27.5% Art (198k).
- Competing spaces – Computer Science often competes with more "passion" subjects in school option blocks, and the subject doesn't currently inspire. There is also disconnection between young girls lived experience and the in-practice experience in the classroom, and for most, there's no obvious link between computing and real-world solutions, making it less appealing.
- **Importance of good teaching** - Where there's a great teacher, practising inclusive pedagogy, delivering inspiring content, and making the connection

between the cultural context and the subject knowledge, the diversity and proportion of young people opting to take it increases.

- **Developments:**
    - Adjustments to grade boundaries in Computer Science GCSE were made in summer 2024 to make it easier to secure good grades.
    - There is growth in the number of females choosing to study computing at university, with significant increases in interest in recent years.