STEM LEARNING | 20 YEARS

Improving lives through STEM education

STEM Learning – 20 years of impact and beyond

20 years of milestones at STEM Learning

We continue to face significant challenges in creating a skills pipeline for the future in STEM related occupations and industries. If the UK is to remain competitive and innovative, we need increasing numbers of young people to be enthused by STEM subjects at school, to be inspired by the careers available and motivated to pursue a STEM related pathway through education and beyond. This will also help create a sustainable and socially equal society.

It all starts with education. The quality of teaching, the attainment of students, the interest in further STEM study, an understanding of the labour market and pathways. At STEM Learning, we specialise in CPD and enrichment, bringing the two together for a more powerful impact and to improve the lives of young people.

We believe that an outstanding STEM education coupled with timely, high-quality and progressive STEM enrichment and inspiration activities can positively impact young people and their future opportunities and address our current and future skills gaps.

Our ambition for the next 20 years is to increase the depth and breadth of teacher CPD we offer, as well as target interventions where it will help provide equal access to opportunity.

Jim Knight The Rt Hon Lord Knight of Weymouth
STEM Learning Chair of the Board

Séverine Trouillet
STEM Learning Chief Executive

2004
Organisation began with an initial £25m grant from Wellcome

2005
First course delivered at the new, purpose-built National STEM Learning Centre in York

2008
Gatsby Charitable Foundation grant to establish the National STEM Centre, making high-quality resources accessible for teachers

2010
National STEM Centre Resources open to teachers

2016
Took over the management of the STEM Ambassador and STEM Clubs programmes

2018
STEM Learning creates National Centre for Computing Education

2024
STEM Learning's vision of 'Improving lives through STEM education' established. Explorify receives the 2024 BETT Award for Primary Free Resource, and the STEM Ambassador programme wins Initiative of the Year at WorldSkills UK Equity, Diversity and Inclusion Heroes Awards

Improving **teaching** for better achievement in STEM

Where we've focused our efforts

The way in which STEM subjects are taught can influence how interested, engaged and informed students are.[1] When teaching is high quality, students are highly motivated and engaged, leading to further progression and attainment in STEM subjects, alongside their understanding of the importance of science within society.[2]

We are supporting teacher recruitment and retention through effective CPD

In the UK we have been reporting a lack of specialist teachers in STEM subjects for many years, predominantly caused by challenges recruiting STEM teachers into the profession with Physics and Computing hardest hit, and some localities and areas of disadvantage additionally struggling to fill teaching vacancies.[3] The challenge is exacerbated by issues in retaining teachers in STEM subjects, with high workload in teaching leading to lack of morale and job satisfaction.[4]

We know that CPD plays a significant role in teacher retention – teachers engaging in STEM Learning CPD are **155% more likely** to remain in the profession compared to those not engaged.[5]

> "STEM Learning's courses have been instrumental in reigniting my passion for teaching. They remind me to look beyond the challenges of recruitment, retention, financial pressures and workload and focus on my core mission - to inspire and support the next generation.
>
> The work done by STEM Learning, along with the funding they secure and allocate, plays a crucial role in supporting our currently fragile education system. By focusing on encouraging, supporting, developing and empowering teachers, they are making significant strides in strengthening the system, which is in dire need of such initiatives."
>
> **Zahra Soodin**
> Head of Science, Northwood School

We are developing more effective teachers of STEM in schools

Teaching is tough. CPD plays a vital role in maintaining up to date knowledge and techniques to keep classroom learning fresh and inspiring. This is especially important if we are to overturn the worrying trend of young people choosing not to continue to study STEM subjects. Our CPD is increasing teacher confidence with **94% of teachers** feeling confident in their teaching after CPD compared to 41% before CPD.[6]

In 2023/24 STEM Learning delivered **7,700** days of high-quality, subject specific CPD to over **36,000** educators throughout the UK.

Teachers and headteachers also tell us that CPD has helped improve the quality of STEM teaching and leadership in their schools with **95% of teachers** showing increased subject knowledge and pedagogical understanding.

Our non-specialist CPD has **trained over 10,000 participants** to become effective teachers of science and computing. Independent evaluation of our non-specialist computer science CPD showed that **98% of participants improved their confidence, subject knowledge and enjoyment** – all factors important in delivering effective teaching.[7]

Building a **strong foundation in STEM**

Improving primary STEM experiences

The importance of a good science education at the primary stage of schooling cannot be underestimated - we know that a child's identity and aspirations with regards to science are formed before they leave primary school.[8] All children will need to leave school with an understanding of some basic scientific concepts to enable them to make responsible decisions as adults, eg about their own health and well-being, and the health of the planet.

Many primary teachers of science do not have a 'secure understanding of the science concepts within the primary curriculum', as well as knowledge of a range of teaching, learning and assessment strategies appropriate for delivering the science curriculum to all children.

Many teachers are not confident teaching science at primary – indeed around 30% of primary schools have a teacher with no science background.[9,10]

This is leading to:

- Many pupils leaving primary school with ingrained misconceptions that they carry through their education[11]
- Lack of interest and enthusiasm in progressing their science education

To help address the problem, we have, working with the Primary Science Teaching Trust, curated an impressive resource bank. This includes Explorify, an award-winning platform that provides a crucial 'stepping stone' for teachers of primary science, with users reporting increased confidence to teach science compared with that of non-users.

Explorify is proven to increase student engagement in science.

90% of educators agreed children asked more questions and **81% agreed** children enjoyed science lessons more.

"Explorify activities are brilliant because you put children in charge of them, so they can be getting that discussion going, answering their own questions, disagreeing with each other."

Teacher from Hinchley Wood Primary School

Enrich **learning** to develop a love for STEM

...and grow the talent pool to foster a thriving UK economy

We are overcoming early bias against STEM careers

Children begin to categorise jobs based on gender, prestige and other societal norms at an early age. They make judgements about which careers are appropriate or desirable for people like themselves based on gender, race and socioeconomic status.[12] Positive role models in classrooms help us to actively challenge the misconceptions, stigmas and stereotypes that surround STEM study and careers.

We believe passionately in the power of bringing real-world STEM enthusiasts and role models to the schools and colleges. Since 2002, we've worked with industry to engage millions of young people, seeing first hand the difference that experience, advice and engagement from real-life professionals and enthusiasts can make.

"I had the privilege of having a marine biology student STEM Ambassador from the University of Warwick explain her journey and how she got into STEM. This really stuck in my mind when I was trying to figure out my future pathway. She had such passion, and I was completely in awe of her energy and experience and how her career pathway was similar to mine. If it wasn't for that experience, I don't think I would have gone on to study biology at university."

Ideja Bajra
Student and entrepreneur

Our **26,000** strong community of amazing STEM volunteers continue to inspire! In 2023-2024 alone STEM Ambassadors gave over **350,000 hours** of volunteering time to inspire young minds and their teachers - bridging the gap between school curricula and its real-world applications.

Developing real-world understanding of STEM

In today's rapidly evolving landscape, the demand for STEM professionals is soaring; there is currently an estimated shortfall of 173,000 STEM professionals costing the UK economy £1.5bn per year.[13] Each year, the problem is exacerbated, with the UK Government estimating an additional 150,000 researchers and technicians are required by 2030 to sustain the UK's ambitions for R&D.[14] Yet, we face a critical disconnect: students do not feel adequately prepared for the dynamic STEM careers that await them.

Here's why:

1. **Lack of exposure:** Many students remain unaware of the exciting possibilities within STEM.[15] They miss out on discovering the incredible impact they can make.
2. **Skills gap:** While theoretical knowledge is essential and well taught through the national curriculum, practical skills are equally crucial.[16] Unfortunately, students often leave education without the hands-on experience needed to thrive in STEM roles. The gap between classroom learning and real-world application persists.
3. **Underrepresentation:** Diversity remains a challenge.[17] Women, minorities and underserved communities are underrepresented in STEM professions. We must break down barriers and create pathways for all aspiring STEM enthusiasts.

To help address these challenges we created Destination STEM which provides support, advice and opportunities to help young people explore pathways into STEM careers, develop their STEM skills and connect with STEM employers.

Destination STEM, supported by fundraising, covers a wide range of activities and skills, all built around sustained engagement. STEM Camps and STEM Clubs are accessed by young people through primary and secondary education, while mentoring and intensive research placements are aimed at those aged 16–18. All of the Destination STEM experiences link young people with STEM professionals, providing vital access to role models and an appreciation of the critical role of **STEM subjects in the real world.**

"What STEM Learning and your partners do is incredible, outstanding and it's hard to put into words. The change it makes to students' lives and the lives of their families is out of this world. I see it first hand in my daughter – I see her becoming a leader, more confident and more capable than she thought she could be, and all this against the backdrop of her being visually impaired. If I could meet each employer partner I would tell them what they do is amazing."

Mannie Bhui
Parent of Aashna Bhui, who took part in a research placement at the Natural History Museum

Engagement with Destination STEM

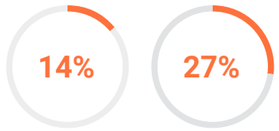
- Boosts young peoples' **confidence, enthusiasm and enjoyment** in STEM
- Has evidence of increasing **GCSE and A level attainment** by up to one grade[18]
- Raises and develops **career aspirations**
- Develops **critical transferable skills,** such as project management, leadership, communication or budgeting – with **87%** of teachers reporting improvements in the transferable skills of young people and **77%** reporting improved interpersonal skills[19]

Grow the **talent pool** to foster a thriving UK economy

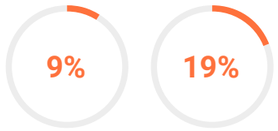
Tackling disadvantage and driving diversity

The benefit of tackling disadvantage and raising levels of diversity and inclusion in STEM education, research settings and workplaces is well understood. Yet progress to date has been limited at best. This issue won't resolve itself with time; we must act decisively now.

Being from a **disadvantaged background** significantly affects the chances of young people **achieving and progressing** in STEM:



Only **14% of disadvantaged** students go on to study STEM subjects at A level, compared to **27% of non-disadvantaged** students.



Among disadvantaged students, girls are significantly underrepresented in STEM A level, with **only 9%** choosing to study a STEM subject compared to **19% of disadvantaged boys.**

Disadvantaged students are **40% less likely** to aspire to a career in STEM compared to their non-disadvantaged peers.

We have focused our efforts in two ways. Ensuring that **Destination STEM** is targeted at those students from the most disadvantaged backgrounds and **making CPD accessible** to teachers from schools in areas of disadvantage.

> "Since completing the I Belong initiative run by the National Centre for Computing Education, we've seen an increase in interest in Computer Science after Key Stage 3. In some years, we have managed to have classes with around 35% of the students being girls."
>
> **Martin Sexton,** Computing Faculty Leader, Mildenhall College Academy

Destination STEM provides targeted activity to young people from disadvantaged backgrounds. Students report that their self-efficacy has increased – they now **see themselves as the type of person who can work in STEM.** Independent evaluation shows that Destination STEM **tackles gender stereotypes,** halving the proportion of young people who thought STEM jobs were "mostly for boys".[20]

Students from disadvantaged backgrounds **are more likely to meet their age-related expectations** for attainment thanks to the support STEM Learning provides to the teachers and schools. Evaluation shows a **10% increase in the proportion of students from disadvantaged backgrounds meeting their age-related expectations for attainment** in the year after their school engaged with STEM Learning.[21]

Our support for teachers helps to tackle the issues underrepresented groups face when progressing in STEM subjects. **More disadvantaged students take triple science at GCSE, over 10% more girls progress to take A levels** in STEM subjects with a **16.7% increase** in the proportion of students taking computing subjects at A level.[22, 23, 24]

Diversity and inclusion in STEM remains a key challenge. Women, people from certain ethnic backgrounds, people with disabilities, those from disadvantaged socioeconomic backgrounds and those who identify as LGBTQ+ are underrepresented in STEM education, research and employment settings.[25] This underrepresentation is not a reflection of ability, but rather a symptom of systemic barriers that need to be addressed.

As of 2023, women make up just 25% of the core STEM workforce. There is significant underrepresentation amongst IT (19% female) and engineering (10%) professionals.[26] This is unsurprising given the lack of female progression in STEM. In 2023, females made up only 15% of computing and 22% of physics A level students in England.[27]

Relatable role models in the classroom become all the more important to counter this imbalance which is why the hugely diverse population of STEM Ambassadors are a much-needed support to our primary and secondary schools.

What's next?

The education system needs long-term, systemic investment coupled with immediate funding to tackle disadvantage of all forms whilst improving diversity and inclusion in STEM education — and indeed in all aspects of society.

A systemic approach to the challenge is required, making the STEM education ecosystem in the UK a beacon of good practice when it comes to addressing underrepresentation.

In addition, targeted funding will support those young people in most need of support today.

We will continue to play our role, harnessing the power of CPD and enrichment to improve lives through STEM. Over the next five years we will redouble our efforts, scale what works and develop partnerships which enable us to reach those most in need.

1 Improve teaching for better achievement in STEM

We will continue to invest in subject specific professional development for teachers of all STEM subjects, through primary, secondary and post-16 to enable:

i. Teachers will have access to training programmes and resources which are high quality, innovative and compelling for school leaders, teachers and students

ii. All school and system leaders to recognise the importance of STEM across all education phases, especially priority schools and those in priority areas

2 Enrich learning to develop a love for STEM

We will grow our student-facing offer, recruiting greater numbers of STEM Ambassadors, assessing and sharing what works, and scaling the Destination STEM programme, dramatically increasing the number of young people who are supported on their journey from education into the world of work to ensure they:

i. Discover the amazing world of STEM and how they can shape the future with their skills and passions

ii. Develop their skills so that they can unleash their potential and thrive in their future career

iii. Access opportunities to experience life within the STEM sector

3 Grow the talent pool to foster a thriving UK economy

Collaboration is the key to addressing the challenges outlined throughout the report. We will collaborate with industry and education across the UK over the next five years, taking a place-based approach to supporting teachers and young people.

With support from industry partners, we will align our teacher CPD offer to industry skills needs, weaving role models and enrichment activities into classroom activity to create a more focused alignment of education to industry needs.

Join us – partner@stem.org.uk

Join us in **our mission**

We are fortunate to work with many thousands of businesses, institutes and other partners to achieve our incredible reach. But we are ambitious and want to do more.

Partnering with us means that together we can target effort where it is most needed. Whether that is direct support to young people, educating our educators or ensuring that resources are current, inspiring and relate to our pressing skills needs. Beyond those personal stories of how an individual has been impacted, we are also generating incredible social value.

Will you join us?

Contact **partner@stem.org.uk** to find out more.

Investing £300,000 will enable **900 teachers** to access high-quality subject specific CPD - impacting the learning of at least **80,000 students** every year generating over **£6m in social value.**

Investment in Destination STEM enrichment activities enables **measurable social value,** providing a return on investment of **£5.4m for every £300,000 invested.**

Thank you!

Thank you to the many schools and colleges who have engaged with STEM Learning and trusted us to develop your teachers, technicians and students.

Scan here to find out who our supporters are

We are immensely grateful to our many supporters and funders – find out who they are by scanning the QR code. Without your generosity, we would not have achieved the extraordinary reach we have over the last 20 years.

A great many achievements over the last 20 years were only possible because of public funding. STEM Learning is incredibly privileged to deliver science and computing CPD programmes on behalf of the Department for Education. The STEM Ambassador programme has also received funding for over 20 years, most recently from UKRI, to ensure that this impactful volunteering programme is able to run.

With particular thanks to our incredible partners who support the work of STEM Learning.

References

1 For example, ASPIRES research conducted by UCL investigated how young people view science and STEM, and how these views change over time. The study found that science aspirations and identity are shaped by whether a young person has had opportunities to experience, do well in, feel connected with, be recognised in and continue with STEM. The study also showed that teaching quality is key to student learning outcomes.

2 The Education Endowment Foundation shows that teaching quality is the most important factor schools have for improving student outcomes. The Centre for Education Statistics and Evaluation shows that teaching quality explains around 30% of the variation in student outcomes.

3 For example, School Workforce analysis by STEM Learning shows how specialist teachers in physics, computing and other STEM subjects are unequally distributed.

4 The State of Education 2023 from the NEU shows that 16% of current teachers plan to leave within two years and 41% within five years. Forty-eight per cent of teachers said their workload is unmanageable, with a further 34% saying "only just manageable".

5 The Impact of STEM Learning Science CPD: An analysis of teacher retention (2023).

6 Science CPD Programme Evaluation (2024) showed that 98% of teachers and 70% of head teachers saw improved quality of teaching as a result of teachers engaging with our CPD.

7 Computer Science Accelerator Evaluation (2020).

8 For example, ASPIRES research conducted by UCL investigated how young people view science and STEM, and how these views change over time. The study found that science aspirations and identity are shaped by whether a young person has had opportunities to experience, do well in, feel connected with, be recognised in and continue with STEM. There is evidence that young people begin forming their 'STEM identity' at very early ages.

9 For example, evidence from the Wellcome Trust shows that over 40% of teachers lack confidence in their ability to answer children's questions about science.

10 STEM Learning analysis of the School Workforce Census shows that 31% of primary schools in England have no teachers with a post-18 qualification in science. Furthermore, 90% of primary teachers do not have a post-18 qualification in science.

11 Ofsted's Research Review on science highlights the prevalence of misconceptions in science teaching and the importance of tackling these before they become ingrained.

12 Gottfredson, L.S. (2002). Gottfredson's theory of circumscription, compromise, and self-creation. In D. Brown (Ed.), Career Choice and Development (4th ed.). San Francisco: Jossey-Bass, pp. 85–148.

13 Evidence from the Royal Society shows a UK STEM skill shortage resulting in a shortfall of over 173,000 workers in the STEM sector. On average, there are 10 unfulfilled roles per business in the UK.

14 Estimates from the UK Government's R&D People and Culture Strategy.

15 For example, the British Science Association Future Forum report shows that young people do not see the full potential for careers in STEM, including a lack of understanding about career possibilities and the creativeness of STEM roles.

16 National Audit Office evidence shows a skills mismatch between STEM skills needed in the UK and the STEM skills available as young people enter the workforce.

17 A 2023 report from a House of Commons Science and Technology Committee enquiry concluded that there is a lack of diversity across the STEM sector. Women, people from certain ethnic backgrounds, people with disabilities, those from disadvantaged socioeconomic backgrounds and those who declared themselves as being LGBTQ+ are underrepresented in areas of STEM education, research and employment settings.

18 Intensive STEM Summer Camps: Final Impact Report (2022).

19 CyberCenturion VIII evaluation (2022).

20 Evaluation of the Polar Explorer Programme (2019).

21 ENTHUSE Partnerships evaluation (2020).

22 Triple Science Support Programme Evaluation (2021) showed that an additional 11,500 students studied GCSE Triple Science from schools in disadvantaged areas.

23 Science CPD Evaluation (2020) showed a 10.1 ppt increase in the proportion of girls progressing to STEM A levels in engaged vs. non-engaged schools.

24 STEM Learning Impact Report (2023).

25 Diversity and Inclusion in STEM, House of Commons Committee report, 2023.

26 WISE Campaign, Workforce Statistics, 2023.

27 Joint Council for Qualifications, 2024.

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