

National Trends and Boosting the Teaching of STEM Subjects in Schools

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National Trends and Boosting the Teaching of STEM Subjects in Schools

- National industry findings and overview of the STEM teaching field
- Developing bespoke professional development strategies to address and overcome teachers' common challenges
- Utilising pathways and working with employers to support pupil progression into STEM careers
- STEM Learning initiatives: transferable skills from case studies of impact

National industry findings and overview of the STEM teaching field

Why is there a STEM skills shortage in the UK and what is being done to correct it?

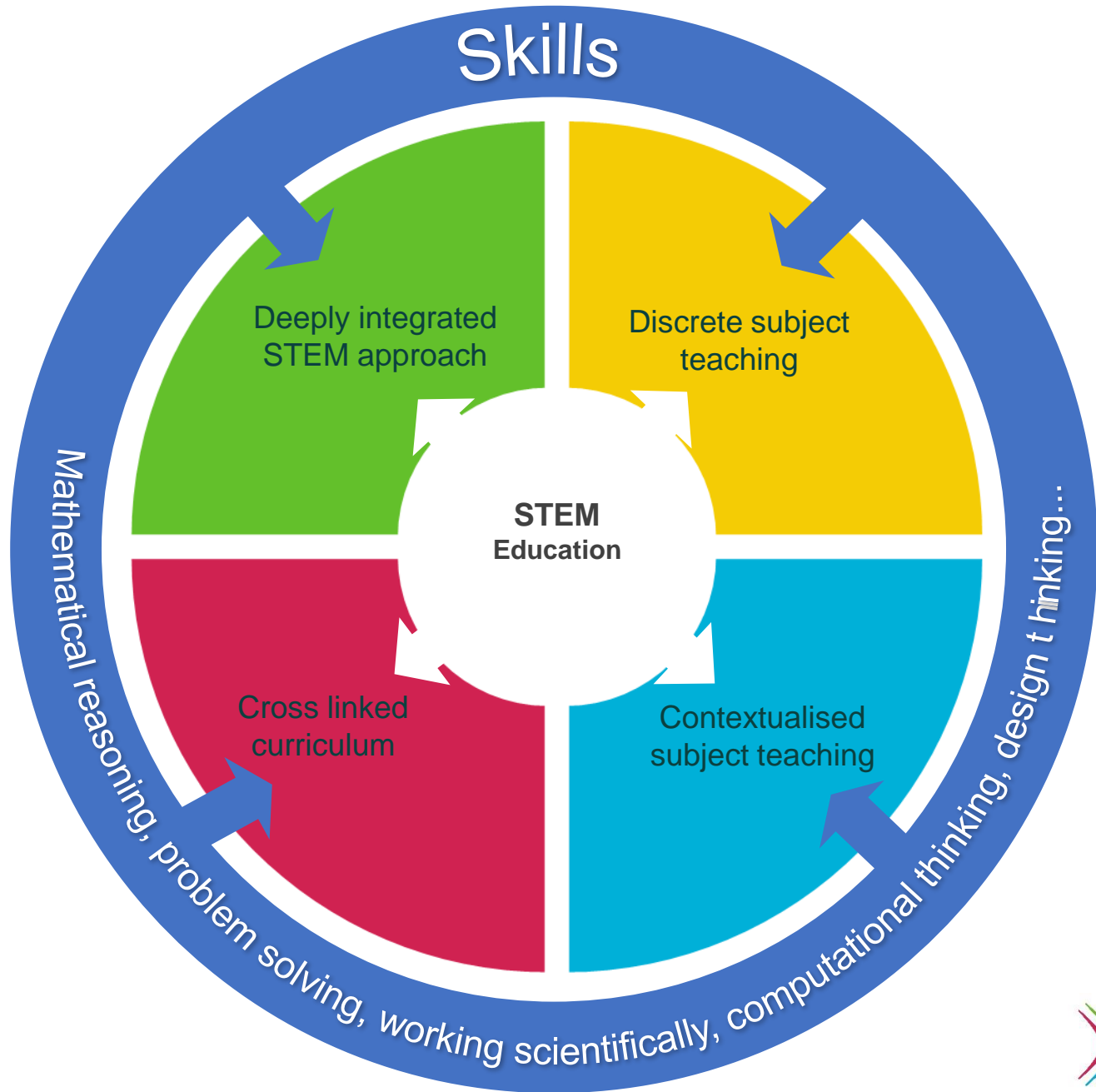
At the moment the STEM shortage in the UK means we're being left behind, but what is being done to fix this and keep the UK a world leader?

According to the UK Commission for Employment & Skills, 43pc of science, technology, engineering and maths (STEM) vacancies are hard to fill. This is mainly down to a shortage of applicants with the required skills and experience.

The core root of this growing skills gap is education, from school through to university and workplace training.

What does STEM look like in schools?

- **Content delivery**
- **Skills development**



STEM Skills – what are they?

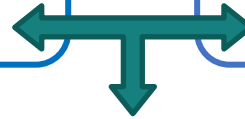
STEM Skills ?

Curriculum based skills

Mathematical reasoning, problem solving, working scientifically, computational thinking, design thinking...

Employer identified groups of skills

Enquiry /Research, Technology, Maths and data, Communication, Analysis, Creativity, Problem solving, Ethics, Ways of working



| | STEM Education |
|------------------|---|
| Enquiry/Research | Questioning, Literature research, debate and questioning, selecting appropriate approaches |
| Technology | Digital application, critical use of tools and specialised equipment, programming |
| Maths and data | Surveys and sampling, data handling and inference, applying methods and algorithms |
| Communication | Listening, understanding and capturing important information, applying subject specific terminology, receiving and using feedback, communicating findings/conclusions/evaluations, Explaining |
| Analysis | Drawing conclusions, interpretation, evaluation, application in new/different context |
| Creativity | Ideation and innovation, prototyping, asking questions, openness to ideas, flexible and divergent thinking, critical thinking |
| Problem solving | Understanding context/need, testing outcome and conclusions, iterative improvement, resilience and tenacity, taking and managing risk |
| Ethics | Decision making, understanding impact/social responsibility, respecting the security, privacy and rights of others, Fair representation and distribution of benefits, validation, reputation and identify |
| Ways of working | Independence, collaboration, self motivation, metacognition – self reflection, safety |

STEM Skills – what are they?

Outputs: what students can do.

Students who:

- **Can analyse**
- **Can evaluate**
- **Are critical thinkers**
- **Are problem solvers**

Developing bespoke professional development strategies to address and overcome teachers' common challenges

- **Recruitment and retention**
 - Teaching out of discipline

Developing bespoke professional development strategies to address and overcome teachers' common challenges

From Science Teaching Survey (RSC/IOP)

- 27% of physics teachers teach biology within combined or single subject GCSE (ECTs: 30%)
- 64% biology and 54% of chemistry ECTs taught physics within combined or single subject GCSE

From Teacher Retention Survey (IOP)

- Nearly half of ECT physics teachers (1 to 5 years) teach less than 67% physics
- 40% of those considered leaving in the last year (twice as many as those with mostly physics)

Developing bespoke professional development strategies to address and overcome teachers' common challenges

Teaching out of discipline

- **Courses for non – specialist.**
- **Specialist support e.g. maths in science**
- **Joining up the curriculum – Maths/science**
- **Stimulating Physics Network**
- **Computer Science Accelerator course in computing**

Utilising pathways and working with employers to support pupil progression into STEM careers

- **Enrichment programmes**
- **Careers**
- **Themed around areas rather than specific careers –
Green Skills Jobs – Sustainability**
- **STEM Ambassadors**
- **ENTHUSE partnerships**

STEM Learning initiatives: transferable skills from case studies of impact

Working in Partnership with Vertex and the Vertex Foundation: changing lives through STEM education



Our ENTHUSE Partnerships have numerous tangible benefits for young people, schools and employers. In this case study we look at how STEM Learning's partnership with Vertex Pharmaceuticals and the Vertex Foundation, a nonprofit 501(c)(3) foundation, has hugely benefitted all of these groups since they teamed up with us in June 2018.

Vertex Pharmaceuticals is a global biotechnology company that invests in scientific innovation to create transformative medicines for people with serious diseases and improve

peoples' lives. STEM Learning shares many strategic principles with them including: inspiring the next generation to love science; supporting children from disadvantaged backgrounds to engage in STEM; maximising community impact and enabling volunteers to share their passion, and improving the progress of girls in STEM subjects.

Vertex believes that STEM careers are inspired by allowing teachers and students to connect with scientists hands-on and were keen to connect their scientists in their Abingdon facility to local schools and community, with a particular focus on improving the students' progress in STEM subjects.

In 2018, the partnership between Vertex and STEM Learning began through their support of an ENTHUSE Partnership in Oxfordshire.



Working in Partnership with AstraZeneca



ENTHUSE Partnerships are a two-year collaboration between STEM Learning, a funder and usually 6-10 schools or colleges. Each Partnership works with pupils, their teachers and subject experts to increase attainment and raise aspirations for STEM careers. This is the story of our partnership with AstraZeneca...

An ENTHUSE Partnership with AstraZeneca is inspiring primary school children to get excited about STEM subjects through fun projects like making burglar alarms to catch Santa.

can now form the basis of more exciting lessons helping to bring STEM subjects to life.

Schools involved say the Partnership has transformed their provision of design and technology, science and computing through the creation of cross-curricular projects and given teachers a new-found confidence and knowledge in STEM subjects.

Lisa King, external science liaison manager for AstraZeneca, said the company wanted to invest in young people and staff near their Cambridge sites.

“The seeds for this Partnership were planted back in 2017 when a colleague visited STEM Learning in York while he was at the University to deliver an industrial placement talk to undergraduates,” said Lisa.

Once the Partnership was agreed in early 2018, science team members from four Saffron Walden schools – RA Butler

Lloyd's Register Foundation joins forces with STEM Learning to develop engineering skills in the next generation



Young people throughout the UK have benefited from the largest ever STEM Learning ENTHUSE Partnership programme thanks to a cash injection of £300,000 from the Lloyd's Register Foundation (LRF).

LRF – the independent global charity that supports research, innovation and education to make the world a safer place – funded 20 separate Partnerships in 2018 in a bid to keep engineering skills at the heart of the curriculum.

Two years on and results from the 93 schools are coming in.

"STEM Learning was an obvious partner for us as half our mission to engineer a safer world focuses on education specifically. Developing the pipeline of engineering skills very much fits with everything we do.

"One of the main benefits is how teachers begin to inspire their classes. If they can ignite a passion in one person, that can echo in ways you can't foresee for years to come."



STEM Learning initiatives: transferable skills from case studies of impact

Currently working on:

- **Digital skills**
- **Data Science**
- **Support for T levels**



STEM LEARNING

