



STEM CLUBS

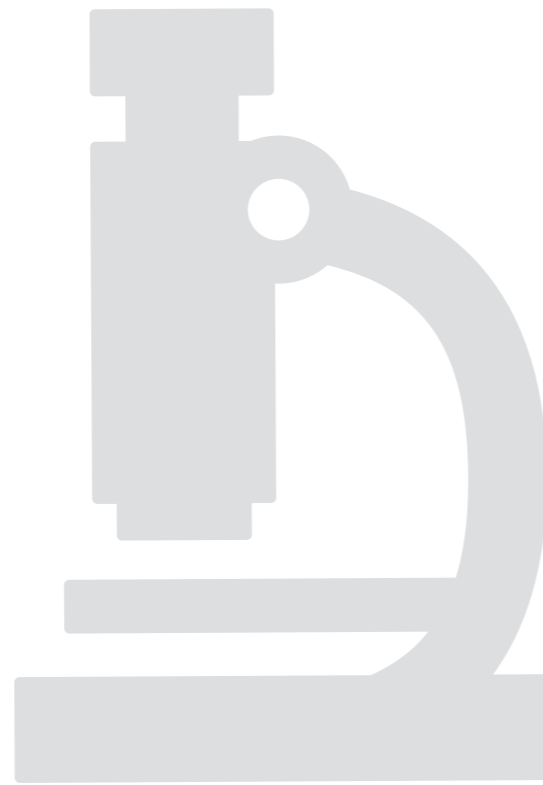
MAKING AN IMPACT
2016-17



Exploring STEM subjects outside the curriculum



STEM Clubs programme at a glance



STEM Learning seeks to help schools and colleges throughout the UK enrich their teaching of science, technology, engineering and mathematics (STEM) by establishing, maintaining and continually developing effective STEM Club activity.

STEM Clubs are out-of-timetable sessions that give school and college students the chance to explore aspects of STEM subjects in more informal settings. Clubs may concentrate on one aspect of STEM or involve cross-discipline challenges.

STEM Learning offers advice and guidance on setting up clubs, as well as ideas and on-going support for leaders, including suggestions for activities, signposting to potential funding, and advice on how to get employers, scientists and engineers involved.

Research shows that STEM Clubs can have significant and measurable positive impacts on students, teachers and other leaders, and the schools or colleges themselves. This report summarises key findings from evaluation and research so far, along with pinpointing areas for future work.

Find out more about the range of support available and how you can get involved: www.stem.org.uk/stem-clubs

Summary

STEM Clubs offer young people valuable opportunities to explore science, technology, engineering and mathematics (STEM) in an informal setting, allowing them to experiment, ask questions and tackle challenges that interest them.

They provide students with opportunities to work in teams and participate in exciting competitions, to design solutions to real problems facing their schools or local communities, to get access to specialist equipment and to work with local STEM employers.

Research shows that being actively involved in a STEM Club can have a real impact on a young person's interest and engagement in studying STEM subjects at school and beyond. It can also inspire young people to want to pursue a career in one of the STEM industries – opening their eyes to the breadth of career options available to them. STEM Learning exists to help teachers and others involved in STEM Clubs maximise these positive impacts through providing quality assured resources and support, from the formation of a STEM Club through to running advanced activities and events.

Evaluation shows that teachers and others involved in STEM Clubs supported by STEM Learning also gain significant benefits. They improve their confidence to teach STEM subjects, deepen and increase their subject and pedagogical knowledge, expand their leadership opportunities and often reinvigorate their passion for teaching. They can forge crucial links with employers and get exposure to cutting-edge developments in STEM.

High quality STEM Clubs, such as those supported by STEM Learning, can also promote positive change within schools and colleges. Departments are encouraged to work more closely together as projects are often cross-curricular, and draw in subjects and staff from beyond STEM. The status of STEM subjects is raised within the school as the STEM Club becomes more embedded, and participating in STEM Club competitions creates a buzz among all students. Opportunities to work with other school or college STEM Clubs can also raise the profile of a school within its local community.

In this report, we share four lessons that emerged from an evaluation of STEM Clubs activity so far. These demonstrate the impacts that Clubs have upon teachers, other Club leaders, schools and young people.

The research shows:

- 1 Thriving STEM Clubs inspire and enthuse young people about STEM subjects, and provide exciting opportunities for them to engage in real STEM activities.
- 2 Taking an active part in a school STEM Club can motivate young people to consider STEM subjects for further study and as a potential career path.
- 3 The STEM Clubs programme empowers the whole school or college and provides valuable STEM curriculum enrichment and enhancement support.
- 4 Teachers that run successful STEM Clubs see a positive impact on their own teaching, drawing on improved and up-to-date subject knowledge, an increased bank of ideas, real-life examples and contexts to use in the classroom and a renewed sense of enjoyment for STEM.

These lessons are developed in further detail and illustrated below, using examples of inspiring and exciting practice from around the country. We hope this will encourage further STEM Clubs and motivate employers and individuals, such as STEM Ambassadors, to get involved in supporting such activity in local schools and colleges.

Together we can work towards creating a world-leading education for all in science, technology, engineering and mathematics, so contributing to the success of every child as well as the UK as a whole.



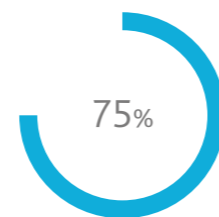
The power of STEM Clubs:

engaging young people and enriching their STEM education

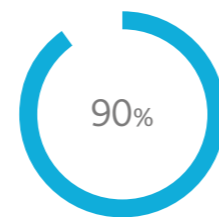
Evaluation demonstrates the positive impact that STEM Clubs have on teachers, support staff, employers and most importantly on young people. We have triangulated self-reported evidence from participants, during and after activities, with internal and externally commissioned evaluations and student achievement data. This gives a robust, quality-assured process with which educators, employers and other partners can engage.

IMPACT ON YOUNG PEOPLE

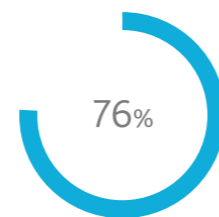
Ultimately, the most important impact is on improving outcomes for young people. We have evidence that STEM Clubs supported by STEM Learning impact positively on the engagement, interest and enjoyment of young people in STEM subjects. We know that such STEM Clubs can deepen and extend young people's understanding of STEM concepts, improve their practical skills and help them to develop employability skills such as teamwork, problem solving, communication and independence. These Clubs also help to increase students' achievement and their awareness of STEM related-careers, which in turn increases the number pursuing STEM study post-16 and progressing into STEM-related careers.



help young people to improve their knowledge of future options in STEM study



increase teachers' and schools' understanding of the benefits of offering STEM enrichment and enhancement activities



increase teachers' own enthusiasm, confidence and passion for teaching

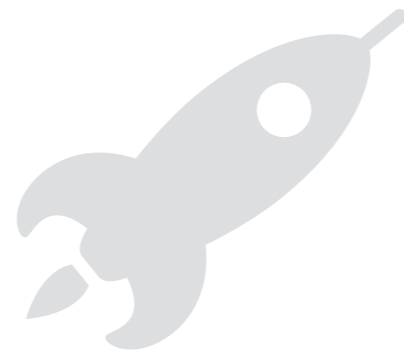
IMPACT ON TEACHERS

Teachers who are involved in running successful STEM Clubs find that they improve their own STEM subject and pedagogical understanding, their confidence, motivation and ability to teach STEM subjects, as well as their leadership skills. We have evidence that through involvement with STEM Learning, teachers update their knowledge of cutting-edge developments in STEM, which they can use to contextualise the curriculum. Evidence shows that taking part in such STEM Clubs helps to retain and reinvigorate teachers and technicians in their work and increases their likelihood of progressing in their career.

IMPACT ON EMPLOYERS

Employers whose staff engage in these STEM Clubs help to inspire young people to see a potential future in STEM employment. They have the opportunity to inform young people and parents about career pathways and employment opportunities with local STEM employers, while promoting positive and inspiring images of their industry.

These figures originate from evaluation reports with sample sizes of between 371-375 teachers, and 2,445-7,698 young people



Model of change

Who we work with

School, college and university staff

Informal educators and leaders of community and voluntary groups

Young people

Employers, government and charities

What we facilitate

STEM inspiration activities and CPD for staff

- face-to-face and online CPD
- study visits and placements with R&D institutions, employers and academia
- school based support
- mentoring & coaching
- networking

Resource engagement

- physical and online curated resources focussed on STEM subjects
- cutting-edge research collections
- STEM careers information and curriculum guidance

STEM enrichment and engagement activities for young people and families

- practical activities, technical advice
- STEM-based competitions and challenges
- extra-curricular STEM Clubs
- information, advice and guidance on routes into STEM careers and pathways
- work experience, mentoring or placements with STEM employers

Vision
To achieve a world-leading STEM education for all young people across the UK

Network of STEM experts: STEM Ambassador Hubs, Science Learning Partnerships, partners in SWANI, employers and supporters

Outcomes

Improvements for teachers, support staff and informal educators in their:

- STEM subject and pedagogical understanding
- confidence, motivation and enthusiasm for STEM subjects
- competence and quality of leading, teaching or supporting STEM subjects
- understanding how to contextualise the curriculum with cutting-edge STEM knowledge, employability skills and STEM-related careers information
- retention and career progression

Increasing STEM Ambassadors':

- professionalism, communication, team working, organisational, mentoring, leadership, delegating and relationship management skills
- understanding of education and how to inspire young people in STEM
- retention in a STEM-based career

Helping employers to:

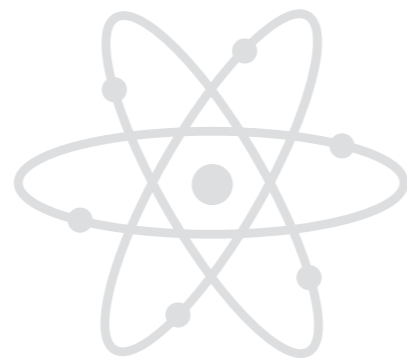
- develop an enthusiastic, motivated and skilled STEM-based workforce
- access an increasingly competent pool of young people with employability and STEM skills with the potential to become future employees
- better inform young people and parents about STEM career pathways and the employment opportunities available with STEM employers

Increasing young people's:

- engagement, interest, enjoyment and achievement in STEM subjects
- development of employability and practical skills
- post-16 pursuit of STEM subjects and progression into STEM-related study and careers

Lesson one:

STEM Clubs supported by STEM Learning inspire and enthuse young people about STEM subjects, and provide exciting opportunities for them to engage in real STEM activities.



You get to try out and use equipment, and learn about processes before you do them in lessons, which gives you an advantage over people that don't go to Tech Club."

STEM Club student

Young people who regularly take part in such STEM Clubs are more likely to enjoy and take an interest in STEM subjects¹. The Clubs offer young learners the chance to take part in different types of extended activities, which enhance the usual learning in their lessons. These activities include designing and making rockets or go-karts, visiting STEM workplaces or receiving STEM-related visitors, taking part in STEM events such as the Big Bang Fair or a STEM-based competition or award scheme.

These STEM Clubs support young people to improve and deepen their STEM subject knowledge, as well as helping them develop and extend transferable skills. They offer hands-on access to practical activities that are based around the challenges faced by STEM businesses.

Nearly nine in ten young people report that their experiences of such STEM Clubs are good or very good²:

"I enjoy being part of a STEM Club... [It] has meant that I get more opportunities to carry out practical activities than I would otherwise. You get the practical stuff you wouldn't do in class, you use your mind and knowledge, you learn something new every week!"
STEM Club student

90% of teachers² and 90% of pupils² in schools that have received support from STEM Learning report that young people involved with the STEM Clubs improve and deepen their conceptual knowledge, understanding and practical skills in STEM subjects. More than nine in ten of these teachers² report that the Clubs provide

the time and space to engage in a more in-depth study of topics, giving young people more opportunities to apply their knowledge, spend additional one-on-one time with their subject teachers, and discuss more challenging questions together.

STEM Club activities are often more practically focused and interactive than STEM lessons, and can provide more opportunities to take part in applied, project-based challenges. The focus is on solving realistic problems in context, commonly initiated by the young people, which promotes a sense of ownership and interest in the tasks. Indeed, 89% of teachers say that STEM Clubs supported through STEM Learning increase young people's awareness of the importance of, and use of science in the real-world².





In maths and physics, it was seeing what I learnt applied in real life [in STEM Club]. Because we'd had to use maths equations and physics, it helped me more in my exams because I'd learnt the facts."

STEM Club student



Not only do young people improve their STEM knowledge through involvement with the Clubs, but also 87% of teachers report that they also develop transferable skills such as project management, leadership, communication or budgeting, which can support other aspects of their lives².

"I think a lot of people like [STEM Club] because it's more practical, and you're getting loads of hands-on [opportunities]. It develops your skills and helps you revise things...you do lots of teamwork. In STEM Club you can use your transferable skills; you really perfect your presentation skills because every other week you're doing stuff in front of the whole group."

STEM Club student

Participation in STEM Clubs is voluntary, which can make a positive difference to the way young people behave and get involved in sessions. At the same time, membership of most Clubs supported by STEM Learning is open to all students, regardless of ability. They provide an inclusive and welcoming environment, which contributes to young people improving their self-confidence, which in turn supports other aspects of their school life.

CASE STUDY

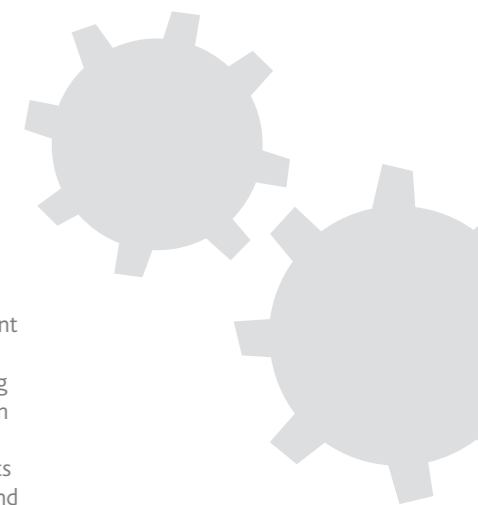
KMF Young Engineer of the Year competition

KMF is a precision sheet metal manufacturing company, based in North Staffordshire.

In 2012, KMF launched their Young Engineer of the Year (YEOTY) competition: an annual engineering challenge for local school STEM Clubs to inspire and capture the imagination of young people in their region. They recruited a range of local employers to sponsor and support each of the participating 23 STEM Clubs. 2016's competition, The Space Project, saw the young people designing and launching a weather balloon into space, and then tracking its descent back to earth.

Space travel captivates everyone, whatever their age, so last year, KMF developed a challenge that would combine space, design, science, film and photography. They had a fantastic response, with 23 school STEM Clubs wanting to take part. Back in October 2015, every team received a kit to get them started at an event at Staffordshire University, returning to their schools to get planning.

Each STEM Club team decided how to organise their projects themselves, allocating roles to team members according to their strengths. Working closely with their local sponsors, they designed their weather balloons and the experiments they wanted to carry out once their balloon was launched into space. They then spent the next eight months building, refining and experimenting with their designs before the big launch event at RAF Cosford in May 2016.



The teams were provided with a range of equipment to support their space missions, such as GoPros to attach to their balloons and capture footage during their flights, and Raspberry Pi devices to track them as they returned to land, which the STEM Club members had to learn how to operate. The students were also required to produce a technical report and presentation about their experiments. Throughout the year, they developed a broad range of skills, expanded their STEM knowledge and really threw themselves into working well as a team, solving complex problems, using high-tech equipment.



My time in YEOTY has both inspired me and made me grow as a person. I have become very interested in engineering and I feel honoured to be involved with my team."

Katy Lloyd, Young Engineer of the Year nominee, Alleyne's Academy

Lesson two:

Taking an active part in a STEM Club supported by STEM Learning can motivate young people to consider STEM subjects for further study and as a potential career path.



You get the practical stuff you wouldn't do in class, you use your mind and knowledge, you learn something new every week."

STEM Club student

Young people derive much enjoyment and interest in STEM by being part of a STEM Club. This impacts positively on their attainment and progress in STEM subjects which increases the likelihood of them pursuing STEM subjects post-16 and STEM-related careers.

Teachers report that there are benefits on young people's attainment as a result of participation in STEM². The impact may be subtle, teachers' caution, as STEM Club activities are not always directly aligned with curriculum, but – according to two thirds of teachers² – there is a definable increase in attainment when young people regularly attend STEM Clubs. Students also rate themselves as performing better as result of being in such STEM Clubs (compared to their non-participating peers), particularly in design and technology and science.

"It helps you understand a bit more, and you also get to ask [the science teacher, during STEM Club] different and difficult questions and she has more time to answer them [than in lessons]. She answers them in more depth. In year seven before I went to STEM Club I would get sixes, but now I get higher grades and I can answer questions in more depth!"
STEM Club student

An improved confidence in their abilities in STEM subjects resulting from their participation in the STEM Clubs leads more young people to consider STEM as an option for further study. STEM Clubs can also improve young people's knowledge of future options in STEM study, according to three quarters of surveyed teachers³. NFER reported that young

people who regularly take part in STEM Clubs are more interested in continuing with STEM than those who do not – especially in science, with nearly seven in ten STEM Club participants expressing interest in further science study compared to just four in ten non-participants².

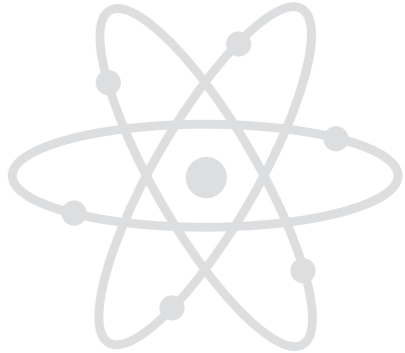
"It [the school's STEM Club] has affected the numbers of students doing STEM subjects, particularly at A level in sciences, design and technology and maths." Secondary school teacher

STEM Clubs have positive benefits for young people's future careers too. Not only do STEM Club members develop vital skills to take forward into their jobs such as teamwork, problem-solving,



CASE STUDY

Plashet School is rated by Ofsted as an outstanding girls' secondary school



Based in East Ham, in the borough of Newham, London, they have run a successful STEM Club, since 2008.

Ann English, Lead Practitioner for Science, Plashet School

We have seen that our STEM Club improves our students' achievements in STEM, and often is the catalyst to them choosing to pursue further STEM study, or to go into a STEM-based career. Setting up our STEM Club, we worked really closely with STEM Learning – they gave us lots of resources, opportunities to network with other schools, access to STEM Ambassadors and support to keep the club going.

When we started the Club, we had a core group of between five and ten girls, from years 7 to 11. They stayed in the club all through their time here, and when they left they all got A* or A's in their A levels, and all of them went on to study STEM subjects at college – two went into medicine and two went into engineering.

Lots of the things we do in STEM Club help our students develop skills they may not have the chance to develop in normal lessons. They get the chance to talk on the phone to businesses, they write emails and letters, they really develop their communication skills and

their confidence gets a huge boost too. We also make sure that they get good exposure to the huge range of STEM careers available to them.

We enter a lot of competitions, and we have had really good success – we often win! We took part in the Cross-World challenge, for instance, which was for year 7 to year 9 students, and all of the groups we entered managed to win! From that project, three of our students secured engineers as mentors and two of them have since gone on to study engineering.

Over the years, we've seen the status of STEM Club grow in school. Our students are very committed, and by taking an active role in it, they develop the ability to be self-directed and motivated in their learning.

STEM Club is always over-subscribed, so much so that we have to ask the girls to apply to join, and they have to be able to explain why they want to be part of it – there's a real buzz about being in STEM Club – the students are so excited to get a place. We tried to limit the numbers to 25, but we've found that once they join, the students don't want to leave so I expect to see at least 30 students

every time we meet. The students know that if they don't attend, their space will be gone the next week – I really work hard to make sure they understand the value of being part of STEM Club.

We meet formally once a week, but the girls are encouraged to spend as much time as they need to during their lunchtimes at the STEM Club, particularly when we're entering competitions, or running large projects. What we do is largely defined by what the girls are interested in: I share a STEM newsletter with them over the summer, and in July they let me know which things they would like to get involved in, and we design projects around that.

My aim, running the STEM Club, is to make the girls feel like they can do anything they set their minds to. I never tell them what to do: I just create a scenario for them, and then let them go for it – I stand back and let them work. It's easy, and it works, when the young people are so motivated and engaged!



I hadn't thought about a career in science before, but because of CREST club and all these STEM challenges we get to do, a career in science is definitely something I am interested in now."

STEM Club student

communication, working independently and experimenting with new ideas, but they also develop a better awareness of the STEM careers open to them, as well as the routes they may need to follow to secure one, according to three-quarters of teachers³.

STEM Club activities can act as a springboard to broaden young people's horizons – encouraging them to work with projects relating to industries they may never otherwise have had exposure to. STEM Club work is often practical, realistic and contextualised, and provides positive insights into what people in STEM careers actually do every day. Such exposure can raise young people's aspirations and motivation to get a STEM-based career:

"Before going to STEM Club, I thought that I would like a job in science, but I didn't really know what was out there, but when I went to the club it raised my awareness of what scientific jobs were out there, so it has helped a lot." STEM Club student

Lesson three:

STEM Clubs empower the whole school and provide valuable STEM curriculum enrichment and enhancement support.



Having a STEM Club in school has helped raise awareness amongst staff and students about STEM, and in the longer-term might increase the uptake of triple science amongst the year 9s."

Teacher of STEM subjects

STEM Clubs have a positive impact on enhancing cross-curricular provision in a school or college. They can increase collaboration between staff and departments within schools and, most importantly, help to raise the profile of STEM subjects within and beyond the school or college.

Nine out of ten teachers who have received support, such as that provided by STEM Learning report that they have seen a positive impact on their school as a result². The biggest advantage reported² is the increase in teachers' understanding of the broad benefits for young people and the wider school of offering STEM enrichment and enhancement activities, which translates to increased motivation to want to run a successful STEM Club.

Successful STEM Clubs can help to raise the profile of STEM subjects in a school or college, according to just under half of teachers surveyed (41%)². In schools with active STEM Clubs, students improve their awareness of STEM and its importance both within the curriculum and in the wider world, and there is an increased "buzz" about STEM amongst the whole student population.

Schools and colleges are also encouraged by the programme to make their STEM Club work cross curricular, so that they can extend their reach and appeal to a wider cohort of students. In some instances, this results in collaboration between science, mathematics and engineering teaching teams, but increasingly, schools are bringing creative subjects into their STEM Club work, including art

and design. Teachers report that this results in a range of subject departments working more closely together, which serves to...

"...create better links, communication and closer working between the design and technology and science departments within the school."¹
STEM Club leader

STEM Clubs enable teachers to be flexible in the choice of topics and the investigations that students undertake. The choice often relates to the interests of the young people, which can be empowering for both teachers and students alike. This increases young people's enjoyment, engagement and participation in STEM, and provides the STEM Club leaders with an improved sense of satisfaction and





It is nice finishing school with STEM Club as I go home thinking that was a quality couple of hours, especially when you see how much the children are enjoying it."

Teacher of STEM subjects



reward – inspiring teachers to invest their time and energy so that STEM Clubs are well resourced and sustainable.

A quarter of teachers report that a STEM Club can also increase the status of a school's profile in the wider community¹. Successes in competitions by STEM Club teams can bring local press coverage, and attract the attention of local communities. Similarly, projects that involve local STEM companies can raise the profile of students as potential employees, as employers get the opportunity to positively influence, and work directly with, young people who may later go on to take up apprenticeships, placements or jobs with them.

Some teachers who run STEM Clubs work with other schools and colleges to share good practice and ideas, to expand the opportunities that they are able to provide for their students, and to find ways to collaborate to enhance their enrichment activities.

CASE STUDY

The Warwick School is a non-denominational mixed secondary school in Redhill, Surrey



Dr Liz Carter, Senior Science Technician, The Warwick School, Redhill, Surrey

I volunteered to run a STEM Club in 2003, and I haven't looked back since! I received really valuable CPD support which showed me the sorts of things I could do in a STEM Club – a course which I have gone on to run for other schools. I make good use of the STEM Learning website, looking for resources, or getting access to STEM-based employers or university contacts to enhance what I deliver at school.

When we started our Club, we offered an open invitation to the whole school, and we originally had lots of year 7 students signing up. Now we find that once someone joins the STEM Club, they stay with us all through the school until they leave after year 11. We get a real mix: some of the more boisterous boys, who are confident enough to come along on their own, as well as girls who come with friends and who often come back with others once they've tried it. If there have ever been detentions taking place in the same room as STEM Club, I often see that those students get interested in what we're doing, and they come along the following week. STEM Club is a really good way to spread the word about how exciting STEM study can be within the school.

Being part of STEM Club improves some of our students' confidence – some of them, when they joined, didn't have such a strong sense of self-worth, but as part of STEM Club, they've been involved in winning awards, or doing really well in competitions, and it's made such a difference. We're able to measure ourselves against other schools, which is a great confidence boost for all of us.

There have been quite a few practical learning activities that I've added into the science scheme of work which originated from the STEM Club – for example, we visited the University of Surrey, where we talked about the sun being a source of natural light. The students were all given LEDs, magnets and batteries to create their own light sources which we used to make drawings in the dark, and which we filmed on a camera with a long shutter speed. This inspired us to apply to the Rolls Royce Science Prize, and we successfully got a grant to use for a light and colour project, so the whole school got to benefit from some new cameras and LEDs to work with in science lessons.

I've been invited to write about the work we do in our STEM Club for the ASE publication, School Science Review: I think it's important to share the things we've learned through our experiences of running the club for so long. I attend regular conferences at the National

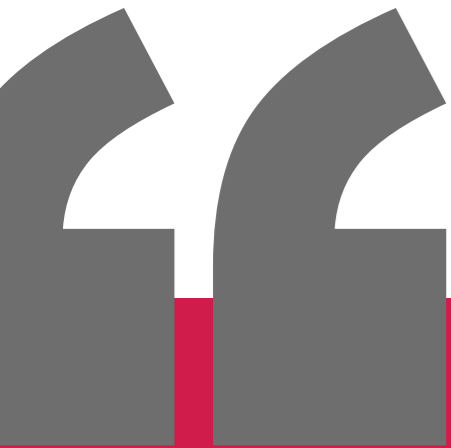
STEM Learning Centre, where I always pick up more ideas for our Club. I've also been involved in running CPD for teachers elsewhere to support them to get a STEM Club off the ground.

Our STEM Club is an integral part of science, technology, engineering and maths education at our school, but also within our local community. We engage our feeder primary schools with outreach activities, and we run a summer school for rising year 7 students alongside the work we do in school with our own young people. We also involve parents and other adults in the community via a range of activities such as technology challenge evenings, annual lectures and even a local bat walk. It's such an important and successful way to inspire others about science.

For me as a science technician, running the STEM Club makes life more interesting. I get to test things out on a small scale, and the teachers get to see what we're doing. We work hard to inspire practice in the classroom, just as much as I want to inspire our students to wonder at the world – it's what keeps me doing this job.

Lesson four:

Running a STEM Club helps teachers improve their enthusiasm and their knowledge for contextualising the curriculum, and increases their professional skills.



The STEM Club is brilliant. [My colleague] has undertaken her own INSET day and I have seen her grow through that."

Head of Science

Running a successful STEM Club can have significant benefits for teachers in the classroom. Research shows it increases their enthusiasm, confidence and passion for teaching whilst also enhancing and updating their subject knowledge. It improves teachers' understanding of current STEM debates and concepts, and gives them better access to STEM employers, which increases their exposure to the world of STEM-based careers. It also improves teachers' pedagogical skills and offers additional personal and career development opportunities.

Taking on a STEM Club is often a voluntary activity, and something that a teacher is able to shape and influence with minimum restrictions, which can make it enjoyable and rewarding. This can have a knock-on effect on a teacher's professional practice, as enthusiasm taken from their STEM Club activities is often reflected back in the classroom – reigniting

teachers' passion for their subjects and for sharing that love of STEM with their students.

76%³ of STEM Club leaders supported through STEM Learning report that they feel more confident teaching STEM subjects as a result of running a STEM Club. Such STEM Clubs offer opportunities for teachers to investigate topics that may not otherwise come up on the curriculum, and to create fun, exciting activities, all of which contributes to an improved confidence in their abilities to continue to teach inspiring lessons.

STEM Clubs are informal learning opportunities, and as such can often contribute to improved teacher-pupil relations, according to one in five teachers². They can be more relaxed and fun, and can enable teaching staff to get to know their students better – to offer a variety of learning opportunities which

helps them to identify young people's strengths that may not always show in the classroom. This helps teachers to better relate to their students, and can improve their pedagogical skills, helping them to tailor and improve their teaching.

Newly acquired specialist knowledge gained through research and carrying out a particular STEM Club project or activity can translate well to classroom-based teaching. One teacher described how he needed to improve and update his knowledge of a specific computer aided design software package to support his STEM Club students to participate in a competition which he then used in his other teaching. Similarly, more than three quarters of teachers report that, having run a STEM Club, they have gained improved knowledge and understanding of current STEM debates and concepts.





CASE STUDY

Parmiter's School is a co-educational state comprehensive school with academy status in Hertfordshire



Dr Jasbir Lota, Head of STEM, Parmiter's School

STEM education is really important at Parmiter's School, and we work really hard to engage all students, especially girls, interested in STEM-related matters. Our approach centres around encouraging our students to 'do things', rather than being told the answers by us. I have worked a lot with STEM Learning, particularly in the early days of our STEM Club. They provided tailored support to us, brought in ideas for investigations (one about the science of chocolate was particularly popular among our students!), gave me advice about where (and how) to successfully apply for grant funding to support the STEM Club, and helped us to forge some really strong and ongoing links with local employers and STEM Ambassadors.

The STEM Club is at the heart of STEM education here at Parmiter's School – and it really encourages young people to think, experiment, test their ideas, and explore STEM with as much freedom as possible. Once students join our STEM Club, they often end up continuing with their STEM studies up to A level and beyond.

The STEM Club meets every week, during lunchtimes. Students get involved in activities

that develop their creativity, their problem-solving and employability skills, and which are cross-curricular, not just STEM subjects but also involving creative subjects such as art. Our STEM Club students participate in competitions regularly, such as the First LEGO League and Rampaging Chariots tournament and attend workshops run by the Society of Chemistry and the Smallpeice Trust.

Our STEM Club students also frequently work on Go4SET¹ team projects – ten-week STEM projects where they collaborate with employers and universities under various themes. For example, challenged to come up with an idea that would create efficiencies for their school, one group of year 9s decided to build a smart system for the school – an automatic student registration system which they hoped would save their teacher valuable lesson time. They made tags for the students to wear, which, when they passed through the door would log their attendance in class without the need for the teacher calling a register. They made it to the South East regional finals of the Big Bang and won the physics category!

I work hard to create links for our students with a huge range of local businesses and research facilities that have links to anything STEM-related, such as Diamond Light Source, the UK's synchrotron – a giant microscope which harnesses the power of electrons to

produce bright light that scientists can use to study anything from fossils to jet engines to viruses and vaccines. I want to show our young people that STEM doesn't just happen inside the school boundaries. These companies inspire our students, and can improve our teaching – they provide us with endless examples of real applications of STEM subjects, which is especially important for mathematics as it allows us to bring together all of the different facets of mathematics together in real contexts to inspire all of our learners.

The way that our STEM Club operates is reflected in our whole-school approach to STEM. We run regular STEM days which are open to all students on a first come first served basis, and which provide them with the opportunity to spend a day working off-timetable on a specific challenge. Most recently, we worked with Network Rail to challenge the students to design and build their own level crossings using mechanised LEGO. It was great to see so many young people taking part, getting so excited and engaged in real engineering problems, working in teams and allocating roles to each other to make the best use of their skills.

STEM Clubs provide teachers with improved access to STEM employers, particularly when a Club takes part in local, regional or national STEM-themed events such as science fairs or competitions, which allows teachers to broaden their network of contacts and to potentially draw external support into their teaching. 69% of STEM Club leaders say that they now have links with a wider range of employers and Higher Education Institutions¹.

Furthermore, more than seven in ten teachers who lead STEM Clubs supported by the programme report that they get better exposure to the world of STEM-based careers, and improve their knowledge of how employers use cutting-edge STEM concepts³. This exposure allows teachers to bring more real-life anecdotes and examples to their own lessons and the experiments they run with their students, thus facilitating greater contextualised learning. 81% of teachers report this as a significant benefit that they have experienced¹.

STEM Club leadership also offers teaching staff opportunities for personal and career development, and STEM Learning offer tailored CPD to those schools it supports. Teachers gain additional skills, such as leadership, which they can use to take on additional responsibilities within their schools or colleges.

"The STEM Club is brilliant. [My colleague] has undertaken her own INSET day and I have seen her grow through that. She has had the support from the [STEM Club] programme in starting a STEM Club, and then subsequently running it, and then she went on to get support in how to deliver an INSET herself, which has been a great growth opportunity for her." Head of Science

How to get involved



Would you like to set up a STEM Club in your school or college?

If you would like support on how to get started, please visit: www.stem.org.uk/stem-clubs

Support to help you set up a STEM Club is also available by joining the STEM Club online community group, where you ask questions across the STEM Club community. STEM Learning Subject Experts will also be on hand to support you too.

Are you a STEM Ambassador or are you thinking of becoming one, and would like to support a local STEM Club?

Many STEM Club leaders appreciate the involvement of STEM Ambassadors in their activities as they bring a fresh perspective to both themselves and their students.

Being involved in a STEM Club can be an excellent way to work with schools. They tend to be informal, and have enthusiastic students who want to participate.

Find out more about the STEM Ambassadors programme, including how to register here: www.stem.org.uk/stem-ambassadors

If you are a STEM Ambassador interested in becoming involved in a STEM Club then please visit www.stem.co.uk/stem-clubs. You can contact us at enquiries@stem.org.uk, and our team will be able to put you in touch with a STEM Club in your area.

References

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STEM Learning operates the National STEM Learning Network alongside other projects supporting STEM education.
www.stem.org.uk