

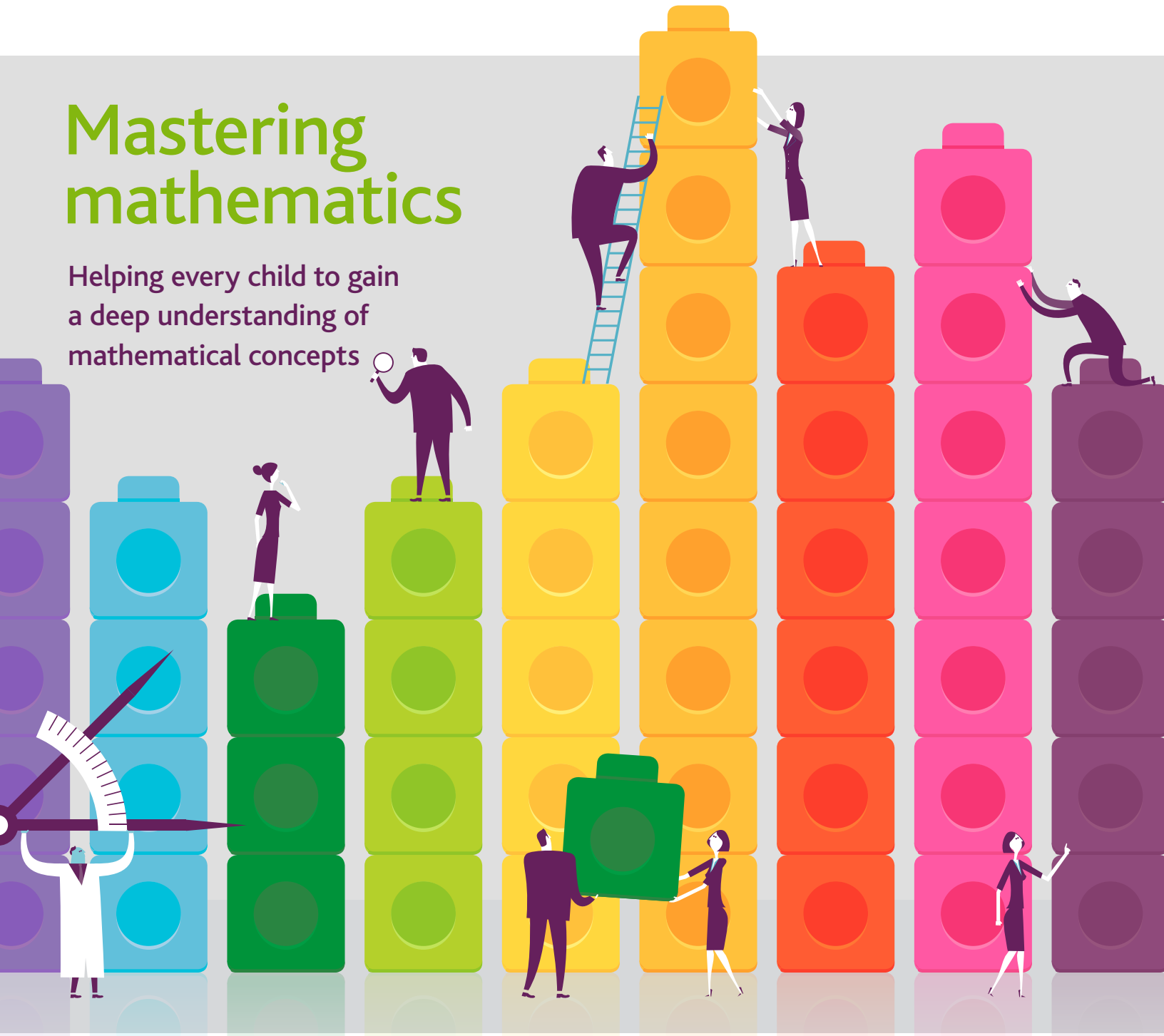
primary (stem) LEARNING

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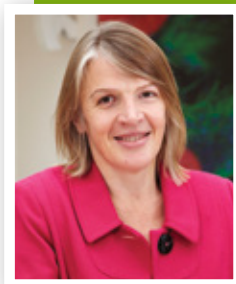
Mastering mathematics

Helping every child to gain
a deep understanding of
mathematical concepts



Get in touch...

We would welcome your feedback on our magazine: feedback@stem.org.uk



Welcome to the fifth edition of our STEM Learning magazine.

Happy New Year! After all the winter festivities I often feel like I could do with another holiday to get some rest from the celebrations!

What I really love about this time of year is the feeling of renewed purpose – and the sense of a fresh start. So what are your New Year's resolutions this year? This year I'm being inspired by this great quote from Eleanor Roosevelt: "Do one thing every day that scares you."

Isn't it easy to get stuck in a rut? We stick with tried-and-tested methods, because we know they work and they feel comfortable. Maybe 2017 should be the year we all push ourselves to do something different, and try something new.

If you're looking for some inspiration we've got some great ideas to get you started!

Why not add a little 'wow' into your lessons? We've got over 10,000 free resources in our online collection – why not take a lesson or topic and add a new experiment, piece of tech or some games to bring it to life?

Have you thought about what activities you will run this March for British Science Week? Why not start your planning early and challenge your pupils with something they never thought they could do, there are so many projects to get your class inspired.

You could connect with one of our fantastic STEM Ambassadors, and bring them into your school this year. Whether you want their support, or you are looking for them to inspire your students on what they could be 'when they grow up', STEM Ambassadors are a great way to shake up what your students think about STEM subjects and careers.

You can find more information about all these schemes on our website, www.stem.org.uk, and plenty more ideas to help you make 2017 the year you tried something new – and loved it.

Yvonne Baker

YVONNE BAKER, CHIEF EXECUTIVE, NATIONAL STEM LEARNING NETWORK

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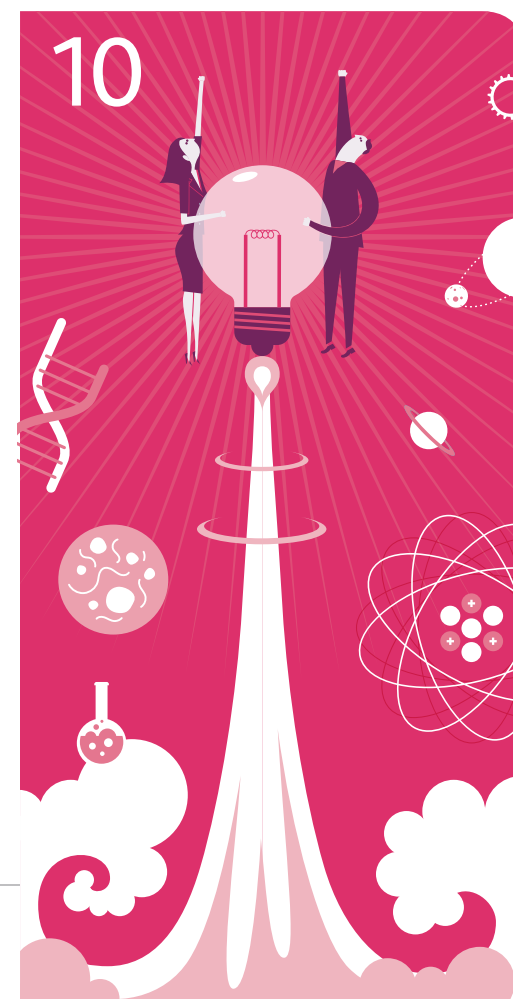
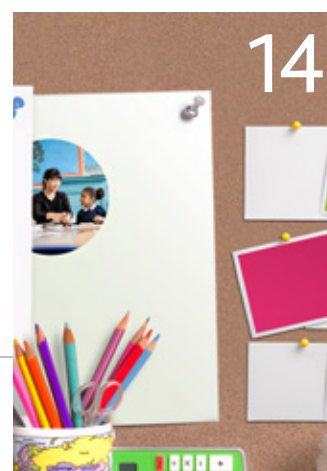


/STEMLearningUK

STEM Learning operates the National STEM Learning Network, incorporating STEM Ambassadors.

Our work is made possible by the generous support of the Wellcome Trust, Gatsby Charitable Foundation, the Government, our partners in Project ENTHUSE and other funders of related STEM projects.

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STEM Ambassadors help bring the primary curriculum to life

by **TIM FILEWOOD**

Joint Science and Computing Leader, Meopham Community Academy

STEM Ambassadors work across a range of STEM-related careers. They volunteer in schools to inspire and encourage young people in STEM subjects. Tim Filewood from Meopham Community Academy explains his experience of working with STEM Ambassadors to bring the primary curriculum to life.



What was your first impression of bringing STEM Ambassadors into your classroom?

We have just hosted our first STEM Ambassador, a former European Space Agency engineer, Marino Saksida. We were all very positive about the visit and could immediately see how we could link Ambassadors to other topics.

How did the STEM Ambassador get involved?

Marino really brought our Year 6 space topic to life. His presentations had a stunning visual impact but most of all he could draw on his first-hand knowledge of the space industry to embellish the details. He used real time satellite data to illustrate what the industry brings to our everyday lives. We also saw how satellites are built in clean room conditions – prompting discussions that linked to our Year 5 microbiology topic.

How did your pupils benefit?

The question and answer session was really useful because it was so open-ended. The first question was of course "How do you go to the toilet in space?", to which Marino immediately called on footage from the International Space Station to explain the engineering solution. The visit sparked genuine interest from the children and they enjoyed the different point of view and context that Marino brought.

How will you use STEM Ambassadors in the future?

I'm looking forward to arranging a visit from a female engineer as a positive role model for my mathematics class. My colleagues have identified ways for STEM Ambassadors to link their Great Fire of London topic to modern fire retardant materials and a local company has even offered to bring in some robots to really bring STEM alive.

What are your top tips for getting the most from a STEM Ambassador visit?

It's really easy to arrange a visit. Make sure you:

- plan ahead – allow a month or two to find the right STEM Ambassador
- spend time talking to your STEM Ambassador before the event and be specific about what you would like them to cover
- help them identify how their experience links to the curriculum
- encourage them to bring items that the pupils can handle and investigate
- test your IT in advance and be ready to troubleshoot on the day

SEE WHAT INSPIRATION A STEM AMBASSADOR CAN BRING TO YOUR CLASSROOM >

■ www.stem.org.uk/stem-ambassadors

CPD ACTIVITIES TO FIRE UP YOUR PUPILS >

Using data loggers and digital technology in primary science
■ www.stem.org.uk/ny011

Enriching the primary curriculum using space and astronomy
■ www.stem.org.uk/ny017

Embedding working scientifically in the primary curriculum
■ www.stem.org.uk/ny030

Mastering mathematics

by **ALISON HOGBEN**
@AlisonHogben

Teacher, Springhead Primary School and Specialist Leader in Education in Primary Mathematics

I was thrilled recently to hear a pupil say: "I can do maths now because I'm doing the same as everyone else". This self-confidence is a result of introducing the mastery approach to mathematics and is one element of the significant impact we've seen on both teaching and learning in our school.



Increased opportunity has resulted in a sharp rise in progress. Pupils with greater depth of understanding can talk about their mathematics much more, as they now have extended opportunities to experience the understanding behind concepts rather than being pushed on too quickly into abstract methods.

With the mastery approach we have two key principles that underpin our mathematics teaching: that every child will have a deep understanding of mathematical concepts, and that all pupils are given the opportunity to succeed.

We spend time carefully planning units of work to ensure that pupils make effective progress. Objectives are broken down into steps so that learning is moved on progressively. Teachers consider which different representations will help pupils' understanding and think through any possible misconceptions that may arise. Problem solving promotes deeper mathematical thinking through application of skills, with reasoning used to assess understanding and provide further challenge. Continuous connections link together areas of mathematics, relating ideas rather than

fragmenting topics. Continuous assessment to judge when learners need more support or are ready for further challenge is vital, and rapid intervention occurs both during and outside of the mathematics lesson so pupils don't fall behind.

One of the biggest differences is that I no longer have ability groups in my class. Because each area of learning is new to all the children, they start at the same point. They are all introduced to new concepts through concrete examples and the use of manipulatives. The stigma that Unifix cubes, for example, are only used by the less able has had to be overcome. Pupils are now used to exploring the mathematics and embedding concepts fully before moving on to pictorial representations and then finally the abstract. Differentiation is no longer about having different tasks for each group; it is about how individuals will solve problems in ways appropriate to their level of understanding.

Through using the mastery approach pupils now have a true understanding of mathematics, they are demonstrating enthusiasm and confidence to learn, and will be able to use their skills for future STEM careers.

INSPIRATION TO SUPPORT YOUR TEACHING >

Developing mastery in primary mathematics
■ www.stem.org.uk/my002

Primary mathematics sessions you don't want to miss:
■ www.stem.org.uk/my007

Primary mathematics resource packages:
■ www.stem.org.uk/primary-maths

by **JESSIE MYTUM-SMITHSON**
@sciencejessie

Enterprising Science Coordinator, National
STEM Learning Centre and Network



Science is for everyone

Many governments and organisations have concerns that not enough young people are choosing to study science, technology, engineering and mathematics (STEM) after the age of 16.

Research from King's College London's ASPIRES project that surveyed over 31,000 pupils since 2009, found that whilst pupils in England find their science lessons interesting, and recognise the value of science, only 15% of young people aspire to become scientists.

Although much time and money has been spent to try and improve the number of young people entering STEM careers, there has been little change in participation rates. The Enterprising Science project – a five year partnership between King's College London and the Science Museum, funded by BP - works with teachers to explore ways of building student science capital and ultimately increasing take-up in science. The aim here is to open doors to all sorts of possible job opportunities in both science and non-science related professions. This year STEM Learning is collaborating with King's to roll out the project with a number of teachers across the North of England to develop a science capital teaching approach.

It's a common misconception in pupils that it's only worthwhile studying science if you want to become a scientist. The more pupils that have the attitude 'science is for me', the greater the likelihood that they will enter a STEM-related career and this is where science capital comes in. Science capital is like a 'holdall' containing all the science-related knowledge, attitudes, experiences and resources that you acquire throughout life.

So if you can increase the amount in your pupils' 'holdall' in school, you can do your bit to help build your pupils' science capital and ultimately help address the shortage in STEM careers. Everyone has a different amount of science capital, the amount of science capital you have will influence the type of job you do, and research shows that students who possess high levels of science capital are far more likely to go into a STEM-related career.

Science capital is a broad concept, but can be broken down further into four categories: literacy; attitudes and values; out of school behaviours; and STEM at home.

Teachers working on the project are building the science capital of their pupils by working into their lessons elements of teaching that will make the pupils feel that 'science is for me'. The aim is to elicit information about your pupils' own experiences, value the everyday knowledge and experiences that pupils bring, then link and relate science to what matters to students, their families and communities. The science capital approach to teaching shouldn't require more planning, only tweaking your lessons slightly – for example, when teaching about nutrition, it can be useful to use local terminology that your pupils will understand based on their diets to help with engagement. The specifics will always depend on your class and their experiences.

Other benefits to using the science capital approach include an increased amount of improvement in behaviour management and an increasing number of pupils feeling that 'science is for me'. This approach has worked well in secondary schools and will also work well in the primary classroom. For example, one year 6 teacher had a group of pupils who were really interested in watching the aerial skiers in the Winter Olympics.

The teacher used the science capital to use this knowledge and posed the question: 'Are Winter Olympians braver than Summer Olympians?'. This led to a series of investigations where the pupils designed ski jumps and launched marble 'skiers'. The class were fully engaged throughout the tasks and produced some high quality work. Teachers have also reported that it helps quieter and lower attaining children to participate more.

ENHANCE YOUR PUPILS' SCIENCE CAPITAL >

What can a STEM Ambassador do for you?
www.stem.org.uk/STEM-ambassadors

Take your science capital to the next level:
 Raising attainment in science
www.stem.org.uk/rp103

Primary science conferences
www.stem.org.uk/ny007
www.stem.org.uk/rp124

FIVE IDEAS TO HELP BUILD SCIENCE CAPITAL IN THE CLASSROOM:

- 1 Set homework for your pupils to watch a science programme with their family and ask them to interview a family member about it.
- 2 Take an everyday object that is familiar to the pupils and talk about how science has influenced the design/function of that object.
- 3 Talk about jobs that involve science skills, not just scientists but other fields of work that involve problem-solving skills, communicating technical information, knowledge of materials or other transferable skills from science.
- 4 Set a simple investigation such as 'Which is the best biscuit for dunking?' or 'Can cress grow in the dark?' for the pupils to do at home and bring their results in for a class comparison.
- 5 Invite industry into your classroom, have a guest speaker who works with science in their everyday work.

Learning in a digital playground

Computer programming has come a long way from a black screen with a cursor, flashing endlessly with the expectation that you already know what you are doing. Computing in primary school is an exciting adventure in a digital playground. Here friendly animals can enjoy fairground rides; robots and drones can be made to dance; and imaginations are set free by the power of programming. Easy-to-use toys in Day-Glo colours provide a means for engagement in learning and fun.

by **DAVE GIBBS**
@adgibbs

STEM Computing and Technology Specialist,
National STEM Learning Centre and Network



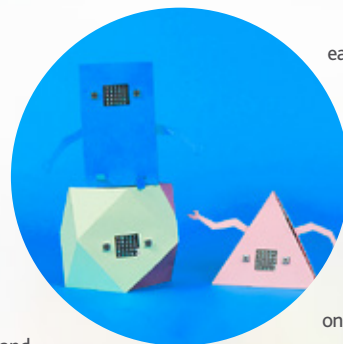
For learners young and not-so young, BeeBots, and the more advanced ProBots, have been around a long time. As an established tool for learning sequencing and basic debugging, they are an evolution of the ideas of the late Seymour Papert, father of computational thinking. The more recent BlueBot allows children to see the working of the robot, and can be programmed by children in early years by placing sequences of easy-to-use tiles.



Programming doesn't come simpler than this.

The programmable vehicle 'My Romo' is a step up in capability and cost, with animated faces and camera interaction through the iOS device that must be docked on top. The strikingly designed duo of Dot and Dash is in the premium range of programmable robots for primary-aged children. It contains a sophisticated system that brings alive programming through music, stories and cross-curricular projects supported by teacher resources. These and others like them share common features – they are tough, they look friendly and they are hugely flexible in use. All are programmed using intuitive block-based programming languages and can develop computational thinking when used properly in the classroom.

Going beyond pre-built robots, options exist at all price points. It used to be true that, if computer technology was cheap, it would require a genius to make it work. Manufacturers in this competitive market have learnt that the interface between machine and human must be simple, reliable and attractive.



easy connectivity and range of programming environments from novice to expert, it is definitely worthy of attention. Link it to Kodu and design innovative games that teach computing fundamentals. With add-on kits from automatic plant waterers to headphones, buggies to Bloodhound rocket cars, the return on teacher investment is guaranteed.

Some teachers are stretching the older children by introducing electronics and computing prototyping kits such as the low-cost @Shrimpingit which can be built without tricky soldering irons. Simpler, but at significantly higher cost, are LittleBits kits that provide an accessible route for children to learn about the Internet of Things. The kit approach strays into design and technology territory, offering great opportunities for STEM projects.

Huge cross-STEM potential is offered by the Picoboard, a plug-in board that helps Scratch to interface to the real world. An inventor's paradise, it can be used for science investigations and data logging. Or how about Makey Makey that can make a games controller with pencil lead or aluminium foil?

If you want to make the best use of equipment you already have, consider programming apps such as Hopscotch or The Foes for the youngest, and A.LE.X., or maybe even Apple's Swift Playground, for older children. If budget allows, use the Tickle app to go beyond the screen and program a Sphero Star Wars droid. You can even convert defunct laptops into Chromebooks using software such as Neverware Cloudready, great for online coding environments such as Scratch 2.0 or Tynker.

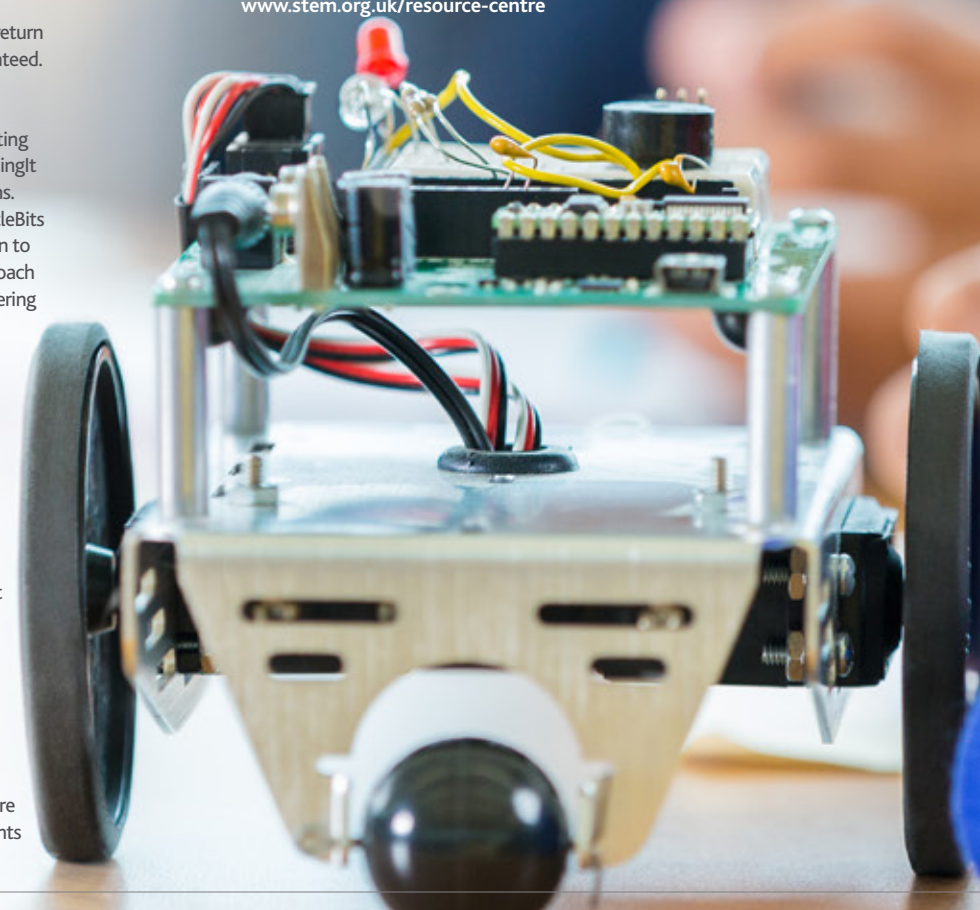
the EV3 Lego system that is suitable for children at the top end of primary school, there are many professional resources and CPD opportunities available to help you get started.

Less costly options for cross-curricular programmable projects include the Crumble. This tiny computer can be detached from the desktop and built into all kinds of weird and wonderful, or even useful, designs. Steerable robot buggies, working traffic lights and fairground rides – you are able to control two motors, lights, buzzers and more through a simple block-based programming environment; the opportunities are endless.

Following a hugely successful roll-out to 11 and 12 year olds across the country, the BBC micro:bit goes from strength to strength and is coming to a school near you. With its built-in LED display,

The National STEM Learning Centre's resource collection is free to visit. Many of these devices and technologies are available to try before you invest your time, effort and budget. Subject specialists are on hand too, to provide unbiased and honest advice, so why not pay a visit to our digital playground?

www.stem.org.uk/resource-centre



GET IN THE SWING OF THINGS

Primary computing conference
www.stem.org.uk/ty007

Getting started with creating mobile apps in the primary classroom
www.stem.org.uk/ty017

Digital resources
www.stem.org.uk/lxhsp

Primary science – raising the profile

by **SARAH DAGNELL** Professional Development Leader, National STEM Learning Centre and Network
@sarahdagnell

My journey with Project ENTHUSE has been life changing. I embarked on my first Project ENTHUSE activity as science lead at Clifton with Rawcliffe Primary School on the new and aspiring primary science specialist course. As a teacher who was new to the role of Science Coordinator and without a science background, I wanted to focus on developing my subject knowledge as well as developing the skills to lead and improve the quality of science teaching and learning within the school. The impact it had was immense, particularly on myself as a subject leader.

Project ENTHUSE is a partnership involving many organisations working together to inspire the teaching of STEM subjects through transformational continuing professional development for teachers and technicians across the UK.

I felt confident enough to agree to become a subject specialist within the school and help raise teaching standards and the profile of science further. Through working with different phases in the afternoons, I mentored staff through supporting lessons, helping with planning and assessment. Working scientifically began to feature more prominently across the school, until planning became primarily focused on it.

This led to more opportunities to further our practice; the ENTHUSE Partnership Project was a natural progression after already working within Project ENTHUSE. My head teacher was chair

of our cluster of schools and was keen to find opportunities to bring us together. He had seen the advertisement for the ENTHUSE Partnership Project, so we focused our project action plan on scientific ways of working.

Through working on delivering lessons, which were planned first and foremost around enquiry objectives, we led our cluster of schools in developing science planning and teaching to improve children's attainment and enthusiasm, and heightening teachers' confidence, knowledge and enjoyment in delivering sessions. What started out as a project aimed at a particular cohort, developed into a raised profile of science across the whole school. The development of teachers was the key.

ENTHUSE Partnerships enable groups of state funded primary schools to work collaboratively to improve teaching and learning in science.

I began delivering science CPD sessions to the teachers of the focus cohort, which were tailored to the outcomes of the project. The careful evaluation and continual action planning showed great results. Our teachers felt confident and happy to deliver quality and inspiring science lessons and pupils loved science and showed excellent progress.

After discovering the existence of the ENTHUSE Celebration Awards, I applied on behalf of my school. The Awards are presented each year to recognise the impact that teachers, technicians and support staff have on their pupils, colleagues, schools, colleges and peers, as a result of ENTHUSE supported professional development. I felt that the impact the ENTHUSE funding had had on my school had been exceptional and we were perfect candidates for the award.

The ENTHUSE Celebration Awards dinner took place in the wonderful headquarters of the Wellcome Trust in London. After meeting all of the other fabulous nominees, each equally deserving, we were whisked over to the main event. Here we dined and mingled whilst listening to inspiring speakers and winners. We were announced as the winner of the Primary School Science ENTHUSE Award – supported by the Royal Commission for the Exhibition of 1851 and I have to admit that accepting it was an emotional experience. It was the accumulation of years of coordinating science within school and transforming the teaching and learning of science.

The award was the pinnacle, an acknowledgement of the hard work and dedication that we had put into raising the quality of teaching and learning of science in our school. It has also given me the confidence to further support other teachers and take advantage of a recent exciting opportunity of a part-time position at the National STEM Learning Centre as a Primary Professional Development Leader. I am now combining my school-based role as well as supporting teachers nationally. Back in school, our journey continues as we start our application for the Primary Science Quality Mark and moving our science teaching ever forward.

HELP TO RAISE YOUR GAME >

New and aspiring primary science specialist
■ www.stem.org.uk/ny010

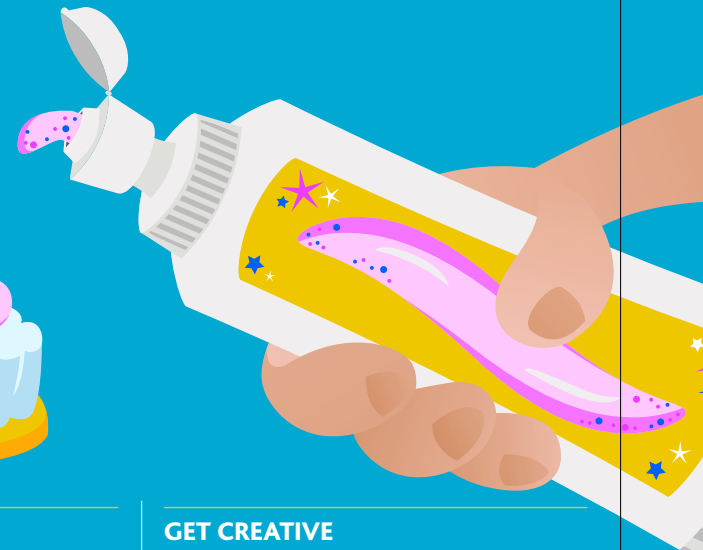
Developing the role of a science subject leader
■ www.stem.org.uk/rp101

Celebrate your school
■ www.stem.org.uk/enthuse-celebration-awards

Teething problems- how to teach the topic of teeth

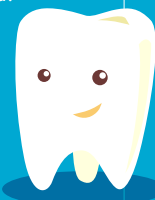
by **KAREN BRUNYEE** Primary Professional Development Lead, National STEM Learning Centre and Network
@travellingkaren

Did you know that a fifth of five-year-olds have some form of tooth decay, according to Public Health England? Learning about the importance of teeth, and how they can affect your health, has never been so important. We've got some great suggestions on how to bring this topic to life in the classroom.



BE A DENTIST FOR THE DAY

Inviting a local dentist into the school can provide you with an opportunity to look at careers associated with oral health. Why not set up a dentist practice role play area? The children can create instructions for correct tooth brushing, with models to practise on. Large Duplo bricks with Play-Doh wedged in the gaps allow for fine motor-flossing activities.



GET OUT THE GNASHERS

At key stage 1, children are asked to compare animals and identify carnivores, herbivores and omnivores. One way to do this is to look at animal teeth and their functions. The book 'What if you had animal teeth?' by Sandra Markle is a great illustrated guide to animal teeth, or you could provide collections of animal teeth. Can the children see the serrations that are used to tear food? Can the children identify which type of eater a set of unnamed teeth came from?

USE MATHEMATICS

Try a mathematics game, where children roll a dice and calculate the corresponding number of teeth from a model mouth, practising their subtraction skills. Dentists recommend brushing for two minutes – can the children estimate how long this is? Get them to bring their brushes from home and time themselves brushing.

TAKE A BITE

At key stage 2, children need to understand the role of teeth in digestion. Getting them to bite into different foods and explore which teeth are doing what is a lovely practical activity. (Of course if the children are missing front teeth, as many in Year 3 seem to be, this may be a challenge!)

WATCH WHAT YOU EAT

Looking at how food affects teeth always has a wow factor. Eggshells, which are basically made of the same materials as teeth, can be placed in different liquids to compare effects. Milkshake is a good choice, as the sugar content can be similar to a fizzy drink. You could follow this up with Pam Ayres' excellent poem, 'Oh I wish I'd looked after me teeth.'

GET CREATIVE

Why not get the children testing toothpastes, and then designing their own? Explore why we add fluoride to our pastes and why some contain baking powder or other abrasive elements. They could also design packaging and market their new paste. Collecting data from their findings can make for a powerful mathematics session, on cost vs profit.

Tackling topics like teeth can lead to exciting activities to get your class talking – if you've got any ideas for how to teach topics in the news, why not add them to our online community resource collection?

BRUSH UP ON THESE TOPICS

Planning schools visits to enhance science and mathematics
■ www.stem.org.uk/nv001

Creating a buzz and raising the profile of science in your school
■ www.stem.org.uk/rp117

Resources to support your classroom activities
■ www.stem.org.uk/lxa7w6



Engineering - encouraging curiosity

by **JULIE WISKOW** Year 4 Teacher and Science Lead, Rode Heath Primary School
@wiskow_julie

The success of our Out of This World whole school space project convinced our school that using a topic-based approach was of great benefit to children's learning. We found that cross-curricular learning supported children in transferring their knowledge across subjects, rather than learning skills in a specific lesson and never making connections. Ever since, I have been searching for another hook to grab both staff and pupils and I think I've found it: engineering.

My inspiration has come from being part of the Tinker Tailor Robot Pi2 project run by Lynne Bianchi in conjunction with Manchester University. Over the course of last year, I worked with a number of enthusiastic, like-minded teachers, all committed to developing Engineering Habits Of Mind (EHOM) in their pupils: improving, systems thinking, adapting, problem finding, creative problem solving, visualising and and at its core, making things work. Or even make them work better! At Rode Heath, we have done this by introducing the concept of tinkering to various year groups: encouraging children to think with their hands. This involved a series of practical activities, with a defined engineering output, where children were not only actively problem solving, but learning to adapt and refine their designs as a matter of course – skills that are most definitely relevant to the rest of the curriculum.

The success of this project, both in terms of increased engagement and tenacity exhibited by the children, led me to think about how we could introduce EHOMs throughout the school so that

they would eventually become a natural way of working for all pupils. After talking with engineers about how they do their jobs, we created our own engineering logbook for each pupil, similar to those used by real engineers. Children will use these books to record their ideas, drawings, notes and reflections, particularly when carrying out engineering-related activities. They will remain with the children as they advance through school, providing a body of progressive evidence.

With the help of local engineering companies, we are putting together a collection of engineering activities for individual year groups. These will span a wide range of engineering disciplines from mechanical and electrical, through to chemical, software and environmental. Where possible, the activities will be linked to an aspect of the science curriculum for that year group.

Just like real engineers, children can progress as they rise up the school through a series of engineering levels. Reception children will start as technicians and move towards achieving the role of senior engineers by the end of Year 6.

Badges or certificates will celebrate their success at each stage. Tables of competencies, located at the back of the logbooks, determine the criteria that children need to meet before they can move on to the next engineering level. These are based on the UK Standard for Professional Engineering Competence, but have been rewritten so they are more suited to the primary sector.

BOOST ENGINEERING IN YOUR SCHOOL

Get your pupils thinking like engineers with the help of these resources:
■ www.stem.org.uk/cx666

CPD TO HELP INCREASE YOUR KNOWLEDGE:
Leading an effective design and technology curriculum
■ www.stem.org.uk/ty011

Teaching engineering in the classroom
■ www.stem.org.uk/ty005

Celebrate British Science Week

by **RACHEL JACKSON** Primary Subject Specialist, National STEM Learning Centre and Network
@jacksonR141

With a big drive this year to support schools with the teaching and learning of science, why not make 2017 the year of science in your school? Find out about how to run a science week in school and get involved with national science initiatives including BBC Schools' and Wellcome Trust's science campaigns.

Running a science week is a great way to excite staff and children about what may be achieved by ensuring science is very much a valued area of learning in your school.

British Science Week runs from 10-19 March, but many schools may opt for a different week to run their events – any time of year is good!

There is so much support out there for teachers organising events and the British Science Association's free packs are a great place to start, as they contain many interesting activities linked to a central theme. There are also quizzes, competitions, home-school booklets and guides to help you get started and run an event. During British Science Week, a whole host of fascinating events and activities will take place across the country to engage people in science, technology, engineering and mathematics. Absolutely anyone can organise an event or activity, particularly schools, community groups and parents. Last year there were over 5,000 events held throughout the week!

There are lots of other ways to enthuse and engage your children throughout the week – we've pulled together a few to inspire you!

PRIMARY SCIENCE – WELLCOME TRUST CONSIDERS WHAT'S NEXT?



We're aiming to take teachers on a journey that will both stand-alone but will also run in parallel to an exciting offer to be delivered by the BBC. We're expecting that any teacher, from the passionate subject leader to the only-just-qualified teacher, no matter how they feel about teaching science, will be able to join in, have fun teaching and learning with their class, and discover what science can offer everyone.

We know that for many teachers any form of science teaching can be daunting so we are delighted to be working on a campaign to reach those teachers who feel anxious about teaching science or who don't perhaps identify with it. You don't need to be a science specialist; you just need to love teaching.

Science is all about exploring, being curious and wondering. It helps to develop thinking skills and reasoning so where better for Wellcome to start than with something that helps teachers do just that by providing really accessible activities to encourage thinking, discussion and wondering. And the good news is that these skills are transferable so in doing more science teaching, your pupils will benefit as learners across the whole curriculum.

ACTIVITIES TO GET YOU INSPIRED:

1. Bring in a science education theatre group – they are great for getting a buzz around the school; we've enjoyed shows on forces, keeping healthy, materials and space.

2. Go for a CREST award, or look at how you may develop science in your school to enter for a recognition scheme such as the Space Education Quality Mark (SEQM) or Primary Science Quality Mark (PSQM).

3. Offer a science workshop in school; many science educators specialise in delivering interactive sessions on a wide range of topics including bridge building, sound and dinosaur exploration. Search for ones near you in STEM directories.

4. Link science with arts activities; you could include an art gallery of paintings/sculptures that links to your chosen theme.

5. Contact your nearest STEM Ambassador Hub to get a real life scientist to support your week. www.stem.org.uk/stem-ambassadors

6. Visit a museum or science centre and take part in a curriculum linked workshop.

7. Ask parents to get involved – and think outside of the box. Often there is a parent who uses science skills in their work, for example, a farmer, chef, gardener or jewellery maker. This is a great opportunity to show children that people they know use science skills in their everyday lives and that science is very relevant to all of us.

LOOK OUT FOR THE BBC SCHOOLS' SCIENCE CAMPAIGN

This year the BBC are championing school science through an exciting new UK-wide primary science initiative, starting in the spring 'Terrific Scientific'. This initiative has been designed for nine to eleven year olds and will inspire children to work scientifically and help schools to deliver key points of the primary science curriculum in a fun, engaging and exciting way, supported by some of the BBC's best known programmes and talent.

From January 2017, they will be supporting science topics with a UK-wide experiment for schools to take part in including online videos, curriculum-specific teacher resources and professional development support.

From January to June, topics will cover:

- animals including humans
- materials and their properties
- earth and space
- living things
- forces



FIND OUT MORE ABOUT BRITISH SCIENCE WEEK >

- www.bbc.co.uk/terrificscientific
- www.britishscienceweek.org
- www.makewaw.es/britishscienceweek

GET A BANK OF EASY TO USE IDEAS WITH THIS CPD >

- Supermarket science
- www.stem.org.uk/rp125

SOCIAL MEDIA

Let's take a peek at what people have been tweeting:

@STEMLearningUK
Followers: 23K



@CodeClubYandH Such an inspiring place! The amazing library @STEMLearningUK #York

@mathsatschool Them blooming @STEMLearningUK libraries. You go looking for one classic item, and find 297 other resources you need to see RIGHT NOW! :)

@Kath_Math How to turn #Boaty into inspiring #STEM classroom activities: @STEMLearningUK @BAS_News @NERCscience @beisgovuk stem.org.uk/polar-explorer

@STEMLearningUK great computing course; learning lots and getting good ideas for @Poppleton_Road

Follow us @STEMLearningUK and let us know what STEM-related things you're up to!

CALENDAR

Our top picks for you to put in the calendar...

FEBRUARY 2017



EDITOR'S
TOP PICK
CHOICE

LIBRARY LOVERS' MONTH FEBRUARY 2017

Library lovers' month is a one month celebration of libraries of all shapes and sizes! Our resource centre, located at the heart of the National STEM Learning Centre in York, houses a collection of thousands of physical resources to support the teaching of STEM subjects.

Whether you're looking for books, interactive resources or DVDs, come and browse all that our resource centre has to offer!

■ www.stem.org.uk/visit-our-resource-centre

MARCH 2017

BRITISH SCIENCE WEEK 10-19 MARCH 2017

The annual celebration is back again for another year of science-related fun and activities. British Science Week is a fantastic opportunity to engage pupils of all ages with science, technology, engineering and mathematics.

With a range of hands-on activities, quizzes and events taking place all around the UK, now is the perfect time to start planning a science week of your own.

■ www.britishsienceweek.org

THE BIG BANG FAIR 2017 15-18 MARCH 2017

With a variety of theatre shows, hands-on activities, interactive workshops and careers information, The Big Bang Fair gives your students a unique opportunity to explore where their future could take them.

This really is a great event for you and your students to get involved in! And did we mention that tickets are completely free?

■ www.stem.org.uk/news/book-now-big-bang-fair-2017

■ www.thebigbangfair.co.uk

APRIL 2017

ENTHUSE CELEBRATION AWARDS APRIL 2017

Have you had a positive impact on your pupils, colleagues or school as a result of subject specific professional development? The ENTHUSE Celebration Awards recognise and reward this impact.

There are a series of regional award events in March and April, with the shortlisted winners being invited to a high-profile event in the House of Commons in July.

■ www.stem.org.uk/enthuse-celebration-awards

MAY 2017

ROLLS-ROYCE SCIENCE PRIZE 29 MAY 2017

Get help implementing science and mathematics teaching ideas in your school with the Rolls-Royce Science Prize. Open to all schools and colleges in the UK, the competition can be entered either by attending CPD through the National STEM Learning Centre or by completing an entry form.

■ www.stem.org.uk/rolls-royce-science-prize

CELEBRATE YOUR ACHIEVEMENT



Teachers, support staff and schools are doing amazing things across the country every day. The impact that you have on your students and your community deserves celebration - and we've got some fantastic schemes to help you do just that.

AWARDS

ENTHUSE CELEBRATION AWARDS

Designed to recognise the impact that teachers, technicians and support staff have on their pupils, colleagues and schools.

Could you be one of the next winners of our ENTHUSE Celebration Awards?

OPEN FOR APPLICATIONS

STEM INSPIRATION AWARDS

Do you enhance and enrich the learning for young people in STEM subjects?

Why not apply for our STEM Inspiration Awards - with an awards ceremony at the House of Lords and a trip to CERN in Switzerland for the winners.

OPENS MAY 2017

STEM EDUCATORS

STEM Educators runs all year, and is designed to highlight the impact professional development has had on you and your school community.

Has your professional development had an impact on you, your pupils, your colleagues and your school?

OPEN YEAR-ROUND

SPACE EDUCATION QUALITY MARK

An award given to UK schools that have shown significant use of the context of space in STEM subjects.

The Space Education Quality Mark is run by the European Space Education Resources Office in the UK (ESERO-UK)

JOIN THE NEXT COHORT

www.stem.org.uk/mp/awards

www.stem.org.uk/mp/recognition

High quality professional development that has impact

We believe all young people, across the UK should receive a world-leading STEM education. We work towards our vision by making it easy for teachers and others involved in STEM education to access subject-specific, quality-assured CPD, so they can teach effectively and inspire the young people with whom they work.

We have chosen a selection of key themes and activities for you opposite.

We provide high impact, bursary supported professional development for schools and colleges that improves subject, pedagogical and leadership skills and knowledge for people working in STEM education.

You can access our CPD nationally, locally and online by visit our website for our comprehensive programme of courses:

www.stem.org.uk/cpd

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All fees and award values are valid for state funded schools and are correct at the time of print (November 2016).

See www.stem.org.uk for fee paying schools and the latest information.



Our ENTHUSE Award bursary funded residential courses are run at the National STEM Learning Centre in York. Teachers or technicians working in state-funded schools in the UK are eligible for these bursaries which can be used to contribute to covering the cost of course fees, supply cover, travel, accommodation, or equipment for your school.



COMPUTING

INTENSIVE SUBJECT-SPECIFIC CPD Accommodation and meals included

HUMAN ROBOTS, DANCE AND THE HAKA – ENRICHING THE KS1 CURRICULUM THROUGH CODING

Supporting primary teachers to gain a clearer understanding of the coding elements of the KS1 computing curriculum.

- Your school receives: £480 ENTHUSE Award
- Activity fee: £480 (ex VAT)
- 22 May 2017 (2 days)
- www.stem.org.uk/cy008

COMPUTING CONFERENCE WITH CAS REGIONAL CENTRE FOR YORKSHIRE AND HUMBER

Sessions led by CAS Master Teachers and other leading practitioners will give you fresh ideas and tried-and-tested lesson activities to help raise the attainment of your pupils.

- Your school receives: £100 ENTHUSE Award
- Activity fee: £80 (ex VAT)
- 30 Jun 2017 (1 day)
- www.stem.org.uk/cy007

“Amazing conference! Truly inspirational lectures with some very clever people. The whole event including venue was extremely professional and I came away with more than anticipated.”

- Computing Conference, 2016 participant.

DESIGN AND TECHNOLOGY

INTENSIVE SUBJECT-SPECIFIC CPD Accommodation and meals included

GOING FURTHER WITH USING IPADS, CHROMEBOOKS AND OTHER TABLET DEVICES IN THE PRIMARY CLASSROOM

Learn the next steps for teachers and teaching assistants who are skilled in using an iPad or tablet device themselves and have some experience of pupils using a tablet device in the classroom.

- Your school receives: £600 ENTHUSE Award
- Activity fee: £600 (ex VAT)
- 8 Jun 2017 (2 days)
- www.stem.org.uk/ty018

TEACHING ENGINEERING IN THE PRIMARY CLASSROOM

Engineering can be used in an exciting context for primary lessons and help inspire the engineers of the future, find out how with our support.

- Your school receives: £700 ENTHUSE Award
- Activity fee: £600 (ex VAT)
- 18 May 2017 (2 days)
- www.stem.org.uk/ty005

USING FILM TECHNOLOGY TO SUPPORT PRIMARY LITERACY

Explore a variety of film related skills and techniques for the classroom, from film analysis and shot direction to creating content using accessible technology and software.

- Your school receives: £600 ENTHUSE Award
- Activity fee: £600 (ex VAT)
- 13 Jun 2017 (2 days)
- www.stem.org.uk/ty021

USING IPADS, CHROMEBOOKS AND OTHER TABLET DEVICES IN THE PRIMARY CLASSROOM

A beginner's guide to using your mobile device in the classroom. It is suitable for teachers and teaching assistants who are users of iPads, Android and Windows based devices.

- Your school receives: £600 ENTHUSE Award
- Activity fee: £600 (ex VAT)
- 25 May 2017 (2 days)
- www.stem.org.uk/ty015

“I found most useful the session where we had the opportunity to implement our learning by developing an activity. We were able to explore the ways that our devices could be most effective in the classroom for teaching and learning.”

- Using iPads, Chromebooks and other tablet devices in the primary classroom, 2016 participant.

“Undoubtedly, I have learnt a great deal about using media literacy to support my teaching. I now feel confident enough to use the technology within my own classroom and will certainly pass on the knowledge to my team, so that they too can use media literacy to support learning in their classrooms.”

- Using film technology to support primary literacy, 2016 participant.

MATHEMATICS

INTENSIVE SUBJECT-SPECIFIC CPD Accommodation and meals included

DEVELOPING MASTERY IN PRIMARY MATHEMATICS

Explore how the mastery approach can be incorporated into primary mathematics lessons. Using a wide range of strategies, we will support you through the use of manipulatives and models to challenge your pupils.

- Your school receives: £700 ENTHUSE Award
- Activity fee: £600 (ex VAT)
- 2 Mar 2017 (2 days)
- www.stem.org.uk/my002

MATHEMATICS FOR THE EARLY YEARS

Explore how children learn within mathematics and develop mastery in number. Learn how to effectively link mathematics and science and discover the practical applications of the Bar Model, Cuisenaire rods and Geoboard across the curriculum.

- Your school receives: £700 ENTHUSE Award
- Activity fee: £500 (ex VAT)
- 15 Mar 2017 (2 days)
- www.stem.org.uk/my008

TEACHING PRIMARY MATHEMATICS

Engage with practical resources to support learning in mathematics, explore good practice in mathematics, and develop your assessment for learning skills.

- Your school receives: £1,050 ENTHUSE Award
- Activity fee: £750 (ex VAT)
- 8 Jun 2017 (3 days)
- www.stem.org.uk/my006

PRIMARY MATHEMATICS CONFERENCE

Develop fluency, reasoning and problem solving across the mathematics curriculum from early years foundation stage through to the end of primary.

- Your school receives: £100 ENTHUSE Award
- Activity fee: £80 (ex VAT)
- 29 Jun 2017 (1 day)
- www.stem.org.uk/my007

“All sessions were extremely useful and I will take away a lot of practical ideas and strategies to use in the classroom.”

- Developing mastery in primary mathematics, 2016 participant.

“I found the session on ensuring engagement of all children most useful, as it will impact most on me and was well delivered.”

- Developing mastery in primary mathematics, 2016 participant.

“The session based around using text as a basis for maths was excellent and relevant to our school, plus the problem solving approaches were also very useful.”

- Primary mathematics conference, 2016 participant.

SCIENCE

INTENSIVE SUBJECT-SPECIFIC CPD Accommodation and meals included

LEADING ASSESSMENT FOR LEARNING

Exploring strategies which will enable you to lead your colleagues in embedding Assessment for Learning (AfL) practices in science.

- Your school receives: £1,200 ENTHUSE Award
- Activity fee: £1,200 (ex VAT)
- 2 Mar 2017 (4 days)
- www.stem.org.uk/ny703

DEVELOPING EXCELLENCE IN KS1 SCIENCE AND MATHEMATICS

Engaging mathematics and science strategies to support progression and deepen understanding in your primary school.

- Your school receives: £700 ENTHUSE Award
- Activity fee: £500 (ex VAT)
- 5 Jun 2017 (2 days)
- www.stem.org.uk/ny055

DEVELOPING EXCELLENCE IN UPPER KS2 SCIENCE AND MATHEMATICS

Develop confidence in your subject knowledge and understanding of mathematics and science at upper KS2.

- Your school receives: £700 ENTHUSE Award
- Activity fee: £500 (ex VAT)
- 3 Jul 2017 (2 days)
- www.stem.org.uk/ny057

EMBEDDING WORKING SCIENTIFICALLY IN THE PRIMARY CURRICULUM

Practical science is essential for inspiring children and teachers alike, you will develop practical strategies to enhance learning in primary science.

- Your school receives: £1,050 ENTHUSE Award
- Activity fee: £900 (ex VAT)
- 27 Mar 2017 (3 days)
- www.stem.org.uk/ny030

SPACE AND ASTRONOMY - A CONTEXT TO TEACH PRIMARY STEM

Using the inspirational elements of space and astronomy, you will engage in activities to extend pupils' knowledge.

- Your school receives: £700 ENTHUSE Award
- Activity fee: £500 (ex VAT)
- 13 Mar 2017 (2 days)
- www.stem.org.uk/ny017

SCIENCE continued

PRIMARY STEM FOR NEWLY AND RECENTLY QUALIFIED TEACHERS

Learn how to plan appropriate and varied lessons in STEM subjects. This activity will help you answer difficult questions and increase your understanding of the primary curriculum.

- Your school receives: £1,050 ENTHUSE Award
- Activity fee: £750 (ex VAT)
- 17 May 2017 (3 days)
- www.stem.org.uk/ny015

TEACHING PRIMARY SCIENCE OUTDOORS

Teach science activities in the great outdoor environment and bring the fun back into teaching. Exploring ideas to excite your children that will encourage learning.

- Your school receives: £1,400 ENTHUSE Award
- Activity fee: £1,000 (ex VAT)
- 5 Apr 2017 (4 days)
- www.stem.org.uk/ny009

USING DATA LOGGERS AND DIGITAL TECHNOLOGY IN PRIMARY SCIENCE

Explore how data loggers and other forms of digital technology can support learning in science.

- Your school receives: £700 ENTHUSE Award
- Activity fee: £500 (ex VAT)
- 20 Mar 2017 (2 days)
- www.stem.org.uk/ny011

ASSESSMENT AND PROGRESSION IN PRIMARY SCIENCE

Evidence shows that effective assessment for learning leads to raised attainment. Identify how you can integrate and embed assessment practices into your science teaching.

- Various dates and venues online
- www.stem.org.uk/rp102

"I feel more confident in my role and understand the first steps I can take towards being a successful science lead."

- Developing the role of the science subject leader, 2016 participant.

CREATING A BUZZ AND RAISING THE PROFILE OF SCIENCE IN YOUR SCHOOL

You will leave full of practical ideas to enrich primary science in your school. You will be inspired to enthuse your pupils about the thrill of scientific ideas and science enquiry.

- Various dates and venues online
- www.stem.org.uk/rp117

DEVELOPING THE ROLE OF THE SCIENCE SUBJECT LEADER

Explore a range of strategies to audit and lead science in your school, understand your role more fully and be able to identify and promote effective primary science.

- Various dates and venues online
- www.stem.org.uk/rp101

ENGAGING SCIENCE IN KEY STAGE 1

Try out ideas for practical science that can be used with young children to develop a range of scientific skills and explore opportunities to promote children's social skills.

- Various dates and venues online
- www.stem.org.uk/rp109

MAKING POWERFUL CONNECTIONS BETWEEN LITERACY AND SCIENCE

Explore the curriculum links between science and literacy and how to develop literacy skills to improve the quality of children's written explanations in science.

- Various dates and venues online
- www.stem.org.uk/rp114

MAKING POWERFUL CONNECTIONS BETWEEN MATHEMATICS AND SCIENCE

Maximise your pupils opportunities to develop their numeracy skills and improve attainment in science by planning lessons in which children effectively handle data.

- Various dates and venues online
- www.stem.org.uk/rp113

PRIMARY CONFERENCE

Our primary conferences always provide outstanding learning opportunities linked to topical developments in primary science teaching alongside time to talk and share ideas with other primary practitioners.

- Various dates and venues online
- www.stem.org.uk/rp124

PRIMARY SCIENCE CONFERENCE

The defining conference for primary science, helping teachers and leaders inspire pupils, develop cross-curricular approaches and tackle the science curriculum.

- Your school receives: £100 ENTHUSE Award
- Activity fee: £80 (ex VAT)
- 28 Jun 2017 (1 day)
- www.stem.org.uk/ny007

PRIMARY SCIENCE SUBJECT LEADERS' NETWORK

A chance for subject leaders to learn about the latest local and national initiatives in science and keep abreast of developments within the subject.

- Various dates and venues online
- www.stem.org.uk/rp121

PROMOTING THINKING AND TALKING IN PRIMARY SCIENCE

Consider the key elements of thinking, talking and communicating in science and develop these skills to create an effective learning environment in your classroom.

- Various dates and venues online
- www.stem.org.uk/rp116

PUTTING SCIENCE AT THE HEART OF EARLY YEARS

Increase your confidence in using a range of approaches and assessment strategies to meet children's needs in Early Years.

- Various dates and venues online
- www.stem.org.uk/rp120

RAISING ATTAINMENT IN SCIENCE

Identify teaching and learning strategies that will move good lessons to outstanding lessons by focussing on the learning happening in the classroom.

- Various dates and venues online
- www.stem.org.uk/rp103

STRENGTHENING SUBJECT UNDERSTANDING IN...

Focus on the big ideas in primary science, helping you make a difference to children's learning by identifying and challenging misconception.

- Various dates and venues online
- www.stem.org.uk/rp112

SUPERMARKET SCIENCE

Providing you with a bank of easy to use ideas that you can take away with you to enable your pupils to conduct experiments and have fun.

- Various dates and venues online
- www.stem.org.uk/rp125

USING COMPUTING AND DATA LOGGING TO SUPPORT SCIENCE

Gain hands-on practical experience using digital technologies in science and be able to decide on the best use of the technology and integrate them into your science lessons.

- Various dates and venues online
- www.stem.org.uk/rp115

USING YOUR OUTDOOR LEARNING ENVIRONMENT

Using the outside world we will create exciting and inspiring investigations that will motivate and engage your pupils to learn.

- Various dates and venues online
- www.stem.org.uk/rp111

WHY CHILDREN NEED TO WORK SCIENTIFICALLY AND HOW THEY CAN

Learn to implement strategies for enquiry in order to improve children's outcomes through effective teaching of scientific enquiry.

- Various dates and venues online
- www.stem.org.uk/rp107

WORKING SCIENTIFICALLY IN THE PRIMARY CURRICULUM - PUPIL LED INVESTIGATIONS

Explore a range of techniques to draw out pupil ideas and develop strategies to inspire and incorporate these ideas into your science lessons.

- Various dates and venues online
- www.stem.org.uk/rp108

CREATING A BUZZ AND RAISING THE PROFILE OF SCIENCE IN YOUR PRIMARY SCHOOL

Explore enriching activities and resources to help you prepare for science week.

- Your school receives: £1,050 ENTHUSE Award
- Activity fee: £900 (ex VAT)
- 3 Apr 2017
- www.stem.org.uk/ny045

"The sessions allowed us to explore a broad range of experiments, while carefully thinking about the type of enquiry we were using. We will use this knowledge in our school to ensure all enquiry types are covered in each year group. We plan to use this session structure in our science inset."

- Embedding working scientifically in the primary curriculum, 2016 participant.

"This CPD event has given me lots of fantastic practical ideas that link well into working scientifically and the national curriculum. I have learnt more about using IT in science and embedding science within wider topics and with other subjects to support teaching and learning. The focus upon assessment was also useful and can be taken back and implemented within my first year of teaching."

- Primary STEM for newly and recently qualified teachers, 2016 participant.

ONLINE

DIFFERENTIATING FOR LEARNING

Improve your understanding and use of differentiating for learning within the STEM subjects. It is designed as companion to our successful assessment for learning course.

- Various dates and venues online
- www.stem.org.uk/online-cpd

MANAGING BEHAVIOUR FOR LEARNING

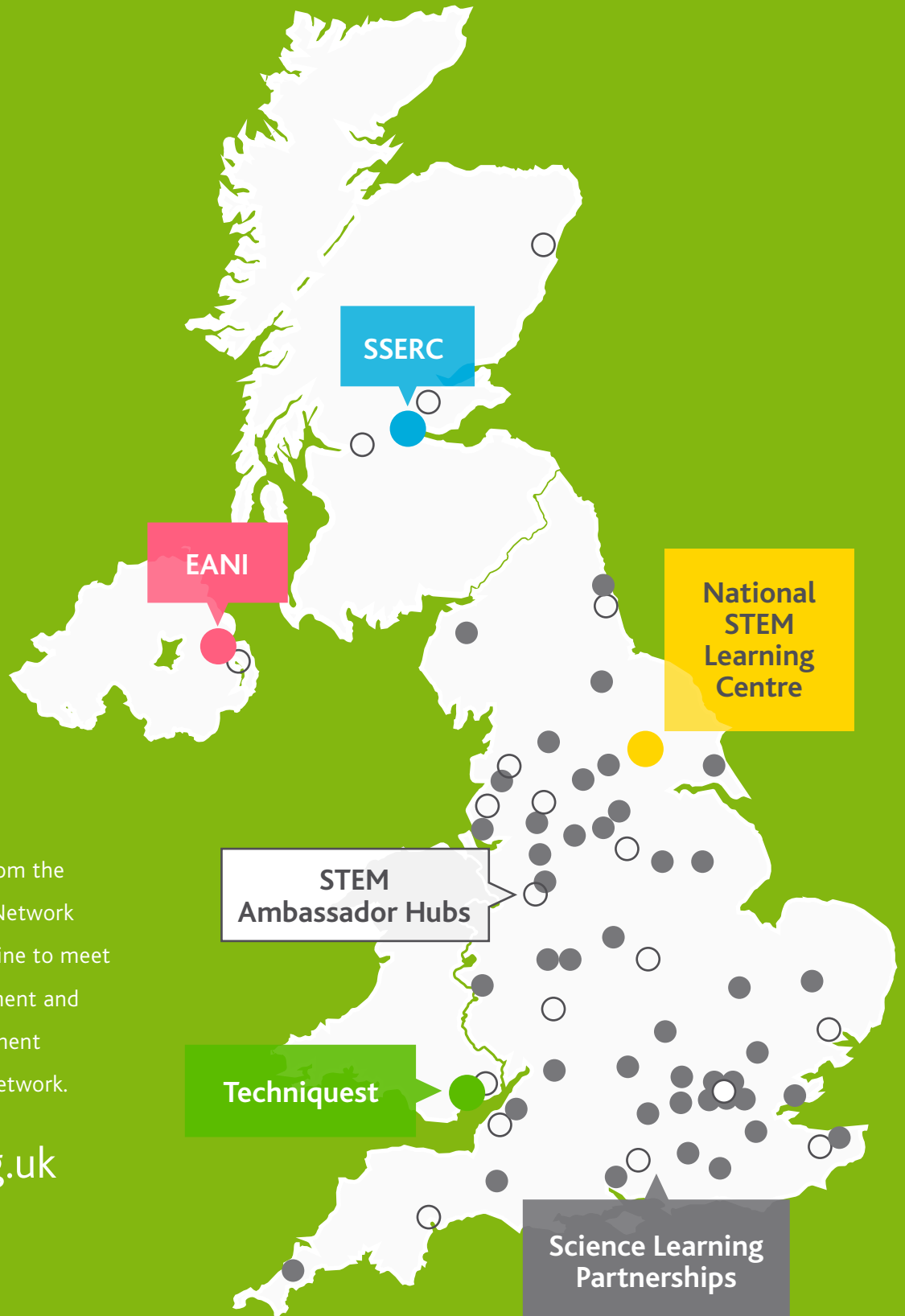
Transform your classroom by making small shifts in your own behaviour. Paul Dix, a leading voice in behaviour management in the UK and internationally, will help you learn how to positively influence the behaviour of your students through small shifts in your own behaviour.

- Various dates and venues online
- www.stem.org.uk/online-cpd

"This CPD was excellent in providing new and exciting ways to teach science across the primary curriculum."

- Why children need to work scientifically and how they can, 2016 participant.

High quality support for teachers across the UK



You can access support from the National STEM Learning Network locally, nationally and online to meet the professional development and enrichment and enhancement needs of your school or network.

www.stem.org.uk