Working Together

Our vision is an inspirational world-class education in computing for every child in England

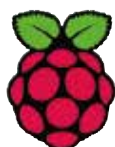# What is the National Centre for Computing Education?

The National Centre for Computing Education (NCCE) is an £84 million initiative that will deliver an **inspirational, world-class** education in computing, from **primary school upwards**.

This will be achieved by delivering tailored continuous professional development to teachers through online and face-to-face courses.

The NCCE is being delivered by a consortium of BCS, The Chartered Institute for IT, Raspberry Pi and STEM Learning who were awarded the government contract. All three have a proven track record in delivering qualifications and continuous professional development.

- STEM Learning leads delivery of face-to-face continuous professional development and facilitates the bursary programme to support teachers and schools to take up training as well as managing the overall programme.

- The Raspberry Pi Foundation leads development and delivery of online continuous professional development, an A level programme, research and the development of a comprehensive bank of resources.

- The NCCE programme is organised around a network of school-based Computing Hubs, geographically distributed around the country. These Hubs will ensure that the programme is school led and reflects the actual needs of teachers on the ground.

- BCS provides academic standards including certification of the continuous professional development, as well as the Computing at School Community of Practice, and engagement with industry.

- Specific initiatives will target girls and economically challenged areas in order that computing becomes more inclusive and accessible to all pupils.

Brought to you by...

Delivering a world-class computing education

National Centre for Computing Education

The Chair of the National Centre for Computing Education (NCCE), Simon Peyton Jones, explains why companies should get involved and support this initiative.

The setting up of the National Centre for Computing Education is incredibly exciting and it's a chance to really focus on what high-quality teaching and learning in computer science looks like and develop outstanding training and materials all based on evidence from research.

Backed by the Department for Education, the NCCE is focused on supporting and equipping computing teachers. There are many excellent initiatives that focus on children, but few that give systematic support to teachers. And yet teachers are a very high point of leverage as one inspirational teacher will influence thousands of children. And the taught curriculum is universal - all children go to school, not just the ones from leafy suburbs.

This is a once-in-a-generation transformation and it will be instrumental in changing the way this subject is taught in schools.

As far as business and industry are concerned, we want you to be involved in this journey.

As you are no doubt aware, we are suffering from a significant digital skills gap in this country, hence why it is so vitally important that we tackle this head on in order to ensure our country's future prosperity.

But just as importantly, we have a shared opportunity to give all our children a truly world-class education in a subject that will equip them as active and productive members of a society that is increasingly digital.

How can we help the new curriculum succeed?
There is an enormous reservoir of expertise and goodwill in our companies - we just need to find a way to "unlock" that reservoir, by providing well-scaffolded opportunities to contribute. This magazine is a start. It describes concrete ways in which you and your employees can help, illustrated with case studies and examples of what works well.

But it is only a start. We need your engagement as an active partner, to come up with creative ways to equip schools and teachers to teach computing as a vibrant, inspiring subject rather than as a dry exam-focused one.

Please join us! We'll help you to join with other employers to make sure that our efforts are cohesive and make the best use of our combined resources. This magazine has a range of examples to give you some ideas of what you can do – you'll no doubt have some of your own – which is great, but above all, do something. In ten years' time, this is something that will have become the norm and it's up to us to make sure that outcome is something we can all be proud of.

Yours

Simon Peyton Jones
Microsoft Research, and Chair of the NCCE

Get involved

Work with us and play a vital role in raising the profile of computing education with businesses, school and college leaders, teachers, parents and young people.

Inspiring the computing experts of the future

Demand for computing skills and knowledge is growing – it is estimated that 1.2 million more people with specialist digital skills will be needed by 2022. We are calling on businesses to join our efforts to ensure young people are equipped with the necessary skills for the future.

By working with us, your organisation can help to deliver a world-leading computing education for each child in every school in England.

How you can help?

Advocacy: speak up for the importance and value of a world-class computing education for every child.

Share: help to raise awareness of the National Centre for Computing Education amongst school leaders and teachers.

Volunteer: encourage your employees to volunteer for computing education initiatives in schools and clubs.

Enrichment: provide talks, mentors, visits, facilities or technology to enrich the student experience of computing in school.

Funding: provide financial support to computing education programmes.

For more information and to let us know how you can help, please contact: supporters@teachcomputing.org

The Barefoot programme
Inspiring primary school children

An aim of the NCCE is to boost the numbers of employee volunteers involved in initiatives already running in schools and clubs. Over two million children have been inspired to learn more about computing with Barefoot, a national programme that is run in primary schools.

The Barefoot programme supports primary teachers to deliver the basics of computer science in a fun, accessible way. It has a bank of online teaching resources and ideas; it helps teachers with their own professional development and there are workshops, led by trained industry volunteers.

One of those volunteers, William Barrie, works for BT as an Area Customer Engineering Manager across a large stretch of rural Scotland. He combines his day job with Barefoot volunteering and says: "They like to see the whites of your eyes in those very remote areas, and it's easier to interact face-to-face instead of via a video link. It's thanks to BT's commitment to the community that I can deliver this training and it really does make a difference. It's not only about being in the classroom it's about getting involved with the community."

The Barefoot-devised tool kit includes a presentation and fun activities to explain topics like logic and algorithms.

He says his volunteering also has a very personal reason, because his own daughter had some learning and emotional difficulties due to a genetic condition called Neurofibromatosis Type 1: "It's a way that I can pay back the teaching profession for all the work they have taken on board with my daughter, Beth. The Barefoot concepts and approaches, which I have learned, use with and have given to Beth, have provided

The phenomenal success of this industry-backed initiative means free teaching resources have been delivered to over 70,000 teachers across 60% of the UK's primary schools.

her with the tools to tackle life's complexities. The change in her is amazing; frustration and anger are no longer the reaction to problems she encounters."

Liz Williams, Director of Digital Society at BT says: "Increasingly, our jobs rely on people having digital skills; which is why the Barefoot programme not only delivers tech skills – it delivers life skills."

"We live in a world powered by technology. Let's make sure the next generation can thrive in it and work together to get Barefoot to all primary-aged children in the UK as fast as possible."

Barefoot was created by BCS, The Chartered Institute for IT in 2014 with funding from the Department for Education. BT took over the lead and funding in 2015, working in partnership with BCS. It is now the leading computer science programme in primary schools in all four nations of the UK.

Anyone can become a Barefoot volunteer – to find out more go to www.barefootcomputing.org

Morgan Stanley gets results

Going into schools with your company's IT staff can help fulfil one of the aims of the NCCE, to provide talks, mentors, visits, facilities or technology to enrich the student experience of computing in schools. This mentoring scheme by banking investment giant Morgan Stanley has helped boost the exam results of pupils.

At the after-school homework club at George Green's School, on the Isle of Dogs in East London, around fifteen teenagers studying for their Computer Science GCSEs are seated in small groups. At each table they are joined by a volunteer from Morgan Stanley. There is a hum of intense discussion as the youngsters pour over their revision text books, thoughtfully quizzing the volunteers about everything from algorithms to AI.

The school, in the borough of Tower Hamlets, lies within the top thirty per cent of the most deprived areas in the country. It's a short journey to the gleaming skyscrapers of London's Canary Wharf, one of the UK's main financial centres, where several major banks have their European headquarters. It's where Mike Skells, a vice president from Morgan Stanley, works and he and a couple of colleagues came up with this idea of community engagement: "We have people who do computer science as their day job and we know there's a huge skills shortage, both as far as teachers are concerned and in the work place."

This approach gets results. When George Green's school ran a Computer Science GCSE course for the first time in 2015, 46 per cent of students achieved a grade A-C. The following year the school made a number of changes, including working with Morgan Stanley, and began to see significant improvements. In 2017 the figure was an amazing 100 per cent achievement of grades A-C.

George Green's is one of six local schools that are visited by mentors from the investment bank. Mike says this project is personally important for him: "They're our neighbours. If Canary Wharf is something that they can see but don't aspire to, then that's a pretty sad state of affairs. We want to make a job here, or anywhere, in tech to be an obtainable goal."
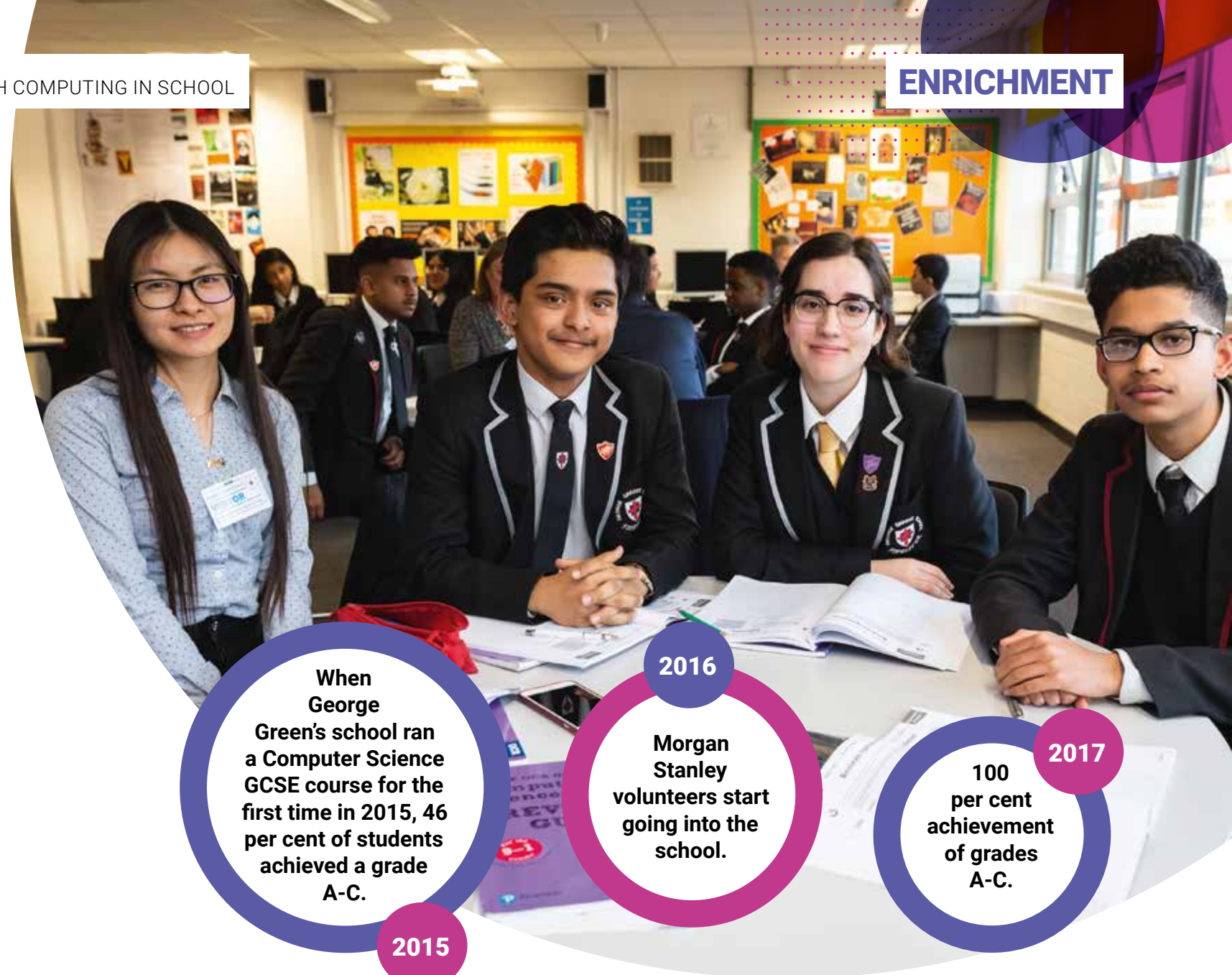
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2015

2016

Morgan Stanley volunteers start going into the school.

2017

100 per cent achievement of grades A-C.

On average, girls usually make up around twenty per cent of pupils taking this subject. This group feels closer to forty per cent. Amy, aged fifteen, puts that down to the approach of the mentors: "Some girls don't realise what computer science is all about – they think it's boring and it's just for boys.

"Then you do these sessions and delve into stuff you've never heard of before and it's so interesting. It is mind blowing."

Jill Baker, head of George Green's School, says it's the enrichment of experiences her school needs, not cash, from their wealthy neighbours: "I never ask the companies for money, never. That seems to me rather rude and not the best approach for fostering positive relationships. We're not out there with a begging bowl, it's about forming relationships for experiences that benefit our students."

One of the benefits is that the volunteers can inspire the youngsters about their future careers, for instance, studying computer science at university, or going onto a digital apprenticeship at Morgan Stanley: "There are bright students here as there are at many schools," says Mike, "and this is a case of showing them this aspiration is achievable."

"If we can get someone from here to be employed with us, then they can come back and say to a school assembly 'if I did it, you can do it.' That is the goal. It's great for us to get skilled people into the school and it's great for positive role models."

The view of pupil Yahya sums it up: "Seeing people who work in computing in the real world puts it into perspective. I'm going to do A level computer science and see where I go from there."

Funding computing education programmes is another of the aims of the NCCE, including backing training and professional development for teachers.

Learning Partnership - Raspberry Pi and Google

Raspberry Pi began working with Google in 2013 to engage young people with computer science education. Since 2017, the focus of the collaboration has been on training teachers.

In 2018 they began a three-year partnership to significantly increase the subject and teaching knowledge, as well as the confidence, of Key Stage 3 and Key stage 4 computing teachers in England. This partnership has led to the launch of seven new online courses in 2018.

Three thousand teachers in England have registered and become active learners on these courses, along with thousands more from outside the UK. 75% of active learners said that taking part in the courses improved their programming skills, and 69% said that taking part improved their confidence in their computing skills.

* Funding period: 2018–2021

* Project funding: £1,000,000

The goal is to have 20 curriculum-relevant courses available, and to have reached at least 6,000 teachers, by the end of 2021. Google staff members also support the work by voluntarily donating their time to help run Code Clubs and Dojos.

Ronan Harris, Google MD UK and Ireland, said: "Despite good progress in recent years, there is still much more to do to ensure young people across the UK have access to computer science education. Whatever school they attend or whatever field they plan to go into, every student should have the opportunity to understand the principles and practices of computing. This will broaden their career opportunities and is critical to developing a globally competitive workforce for the 21st century."

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Inspirational training for teachers

Microsoft funds *Creative Computing for Key Stage 3*, a course that aims to put the zing back into computer science, by training heads of departments to inspire pupils with novel, unplugged activities in the classroom.

"I was asked how to make cyber security more interesting, less dry, and I came up with the idea of using Morse code and semaphores," says Beverly Clarke, one of the trainers on a course, funded by Microsoft, for aspiring and current secondary school heads of computing departments. This slightly unusual approach was a big hit with teachers who were looking at fresh ways to make their subject as engaging as possible. Trainer Tig Williams, who devised and teaches on the course, says: "I've had participants come up to me afterwards and say, 'that was awesome!' They have been beyond effusive in their comments."

Beverly says trying to figure out what will work best with each class is usually her first task, as the course is designed to meet the needs of experienced teachers, as well as those who are relatively new to the subject. "What I try to do is find the gaps in their knowledge and sometimes it's a case of adjusting what material I have on the spot, but it's always a joy to see the teachers grow in confidence."

As can happen in any classroom, Beverly can sometimes find herself mulling over a tricky question posed by course participants and it was at that moment that she came up with the idea of a more novel approach: "I thought of interesting ways that they could teach what a code is, and how it can be used in a practical way and this seemed to be the answer. I even suggested how to make the semaphore flags using coloured paper and straws!"

Using industry funding to invigorate teaching

Microsoft UK has provided funding for 100 teachers to access the *Creative Computing for Key Stage 3* course so far, priority is given to teachers in disadvantaged areas.

This is a great example of how industry funding can make a difference in schools. One participant who attended the course in Nottingham said it was a "great opportunity to think about what you're doing and why you're doing it and how you're going to do it differently when you get back into school". Another added: "I'm already teaching Key Stage 3 and plan on making big changes to scheme of work based on what I've learned on the course today".

BT, Rolls-Royce and Arm invest in the NCCE

The NCCE is already beginning to achieve its aim of getting major companies to sign up and back the initiative.

BT, Rolls-Royce and Arm, have signed up to support the National Centre for Computing Education. Yvonne Baker, Chief Executive of STEM Learning, on behalf of the NCCE said, "Having the support of industry is vital to the overall success of the NCCE, and so we are delighted to be able to announce our first round of sponsors. Businesses are very aware that the young people benefitting from this investment will be their workforce of tomorrow. High quality, knowledgeable teaching of computing is the cornerstone of achieving this."

BT is a strategic partner and will contribute significantly over the next four years, putting the Barefoot teaching resources for primary-age children at the heart of the NCCE's offer for primary school teachers. Philip Jansen, BT's Group Chief Executive, said, "A dynamic economy requires a tech-literate society, where young people don't just consume technology, but really know how it works. Our children need the skills to become the problem solvers and digital innovators of the future. The NCCE is a critical step towards this, and I'm delighted BT will be its first strategic partner, bringing our work in primary schools through Barefoot Computing to even more teachers and their pupils."

As part of their ambition to ensure no child is left behind, Rolls-Royce will sponsor bursaries for schools to enable them to take full advantage of the opportunities on offer through the NCCE. This will complement their extensive existing school engagement programme delivered through STEM Learning's Project ENTHUSE.

Paul Broadhead, Head of Community Investment & Education Outreach, Rolls-Royce said, "Through our existing work with Project ENTHUSE we know that high-quality continuous professional development for teachers makes a real, positive difference for young people and so we are thrilled to be helping amazing teachers to enthuse their students about ours and their digital futures."

Arm will also sponsor bursaries enabling teachers in areas where pupils make the least progress and have the poorest access to high-quality schools, to access continuing professional development through the NCCE. Furthermore, the Arm School Program is working with its partners – including the NCCE and Computing at School – to develop quality, free-to-access teaching and learning resources.

"Arm is committed to working with partners such as the NCCE to close the skills gap and engage the next generation in STEM disciplines such as computing," said Graham Budd, President and Chief Operating Officer, at Arm. "The NCCE will play a vital role in encouraging more students from all backgrounds to expand their experience of computing inside and outside of school. Additionally, our Arm School Program will support the NCCE on a variety of key initiatives over the coming years."

This investment will particularly help increase the number of pupils in schools and colleges studying computer science at GCSE, AS and A level, particularly girls and those in disadvantaged areas.

If you want to get involved – please email supporters@teachcomputing.org We'd love to hear from you!

Support NCCE bursaries to help develop inspirational teachers

- We understand it can be difficult for teachers to get out of the classroom to attend training - they need help to cover associated costs, including course fees, travel and supply cover.

- That's why we are raising funds to offer bursaries to help teachers at state-funded schools and colleges attend NCCE CPD.

- BT, Rolls-Royce, Arm and the Department for Education have provided generous support, but we still need to raise another £1.3million.

- By working with us or investing in bursaries to develop excellent teachers, you can help to create an inspirational world-class education in computing for every child in England.

What can you do?

We need your help - Please arrange to meet with one of the NCCE representatives to explore how your organisation can get involved directly

•**Advocacy** - speak up for the importance and value of a world-class computing education for every child

•**Share** - help to raise awareness of the National Centre for Computing Education amongst school leaders and teachers

•**Volunteer** - encourage your employees to volunteer for computing education initiatives in schools and clubs

•**Enrichment** - provide talks, mentors, visits, facilities or technology to enrich the student experience of computing in school

•**Funding** - provide financial support to computing education programmes

Contact us:
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