Computing and EdTech

A conversation with Jo Stone

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There are two aspects we need to explore in the primary computing curriculum. The first is what pupils will learn: where pupils should start in KS1, and what should they know by the end of KS2? The second aspect is to think about how computing is integrated across the curriculum, so that pupils can apply their computing knowledge and skills to other curriculum areas.

Computing should start in EYFS and go through to Year 6. There are several pathways you could take, such as Teach Computing or the Southwest Grid for Learning. Programmes like these can be run alongside your curriculum and used discretely. However it is delivered, computing needs to be in the curriculum in every school.

The way we are delivering computing in the Discovery Trust is through TDT (teacher development time). We take computing specialists in our trust, and they produce asynchronous recorded computing lessons. This means that teachers with a specialism in computing record lessons from Year 1 through to Year 6. While these asynchronous lessons are delivered to classes, class teachers have teacher development time, which is in addition to their PPA time.

This means that the computing curriculum is taught by specialist teachers, and it means pupils receive great teaching with content delivered at the right level. Pupils are supported in the classroom by the technician and HLTA, and in some cases, the teacher as well. We are trialling this as action research. It's working well so far, because it means that teachers can be released to develop their subject knowledge, whether it's for computing or other subjects.

In Year 1, pupils need to understand the basics such as mouse skills, keyboard, typing skills, how to log on to and log off a device properly. Then we teach pupils how to code, using algorithms even in KS1. They do this by creating instructions through algorithms by using programs such as Bee-Bots or Dash and Dot bots, for example. Pupils develop coding skills through robotics. Then there are programs such as Scratch which immerse pupils in computing. We also use virtual reality headsets to immerse pupils in different experiences within computing.

We know that the gaming world is big, and we need to teach pupils, not just about how to use this technology, but also how to use it safely. Throughout primary we emphasise the e-safety element: an understanding of what's fake news, what's real and how to keep themselves safe online. We deliver 10 minutes of e-safety at the start of our discrete computing lessons, then we also advise the teachers to build that into other lessons so that there's a consistent message. Pupils in KS1 use simple programs, such as Paint. We take the time to embed their skills, in the same way as we would with handwriting, because we need to make sure that the keyboard skills are secure.

In lower KS2, pupils transition from using basic skills to navigating the programs more independently. The focus is still on robotics and coding. We also introduce elements of Minecraft. While it's tempting to think that Minecraft is mostly about gaming, there is plenty that pupils can learn through using it. We also believe it is important to allow pupils

to have some structured and free play with some of the programs. This means that they're learning the instructions of computing, but also have the chance to break the rules and explore.

When they get to Year 6, we expect pupils to take the skills they've learned through the computing curriculum and apply them to other contexts, for example through problem- and project-based work. Then when pupils go into Year 7, we hope that they can really fly.

In addition, there is the blended learning thread of the computing curriculum. The Discovery Trust uses Microsoft because we believe pupils will be using these skills through school and beyond. Microsoft is something that you might also use in work, and we want pupils to be able to use these by the time they leave. For example, in Year 1, pupils are taught how to start using Teams in Microsoft. This is at a very basic level, alongside their parents at the beginning of the autumn term. Then we bring in programs such as Kahoot! and Flipgrid because these develop pupils' oracy skills. For example, the teacher might send the child a video message about what they want them to learn, and then the child responds with a video clip and explains what they have learned.

The Trust also uses Tapestry across EYFS, Year 1 and Year 2, and pupils use the child account to either take pictures of their work and type in short reflections, or they might video themselves making a comment about the photograph that they've just taken of their work. Year on year that's layered up. For Year 6 we expect that all these basic typing skills have paid off and pupils should be fluent in typing. We expect pupils in Year 6 to be able to use Teams competently and they also use programs such as Sway. In Year 6, for example, pupils design and create web pages. We use Sway so that pupils can create the hyperlinks without their material being on the web, which is important for safeguarding reasons.

Pupils also use OneNote and have a digital notebook. Some of their work is on OneNote, for example reading and some maths lessons. We treat this as a blended approach. It works very well for reading because it's possible to use a variety of texts and share them easily. We expect pupils to be able to use the pages and the sections, and then save and record their work. We also expect them to be confident using PowerPoint, Word, and Excel.

We believe it is important for pupils to do their work with an audience in mind and that they have a tangible outcome as a result of what they

have learned. For example, they are able to share their web pages with their families. In the same way, their podcasts are available through Audacity software. As with other elements of computing, pupils receive teacher input, they are given a few things to try, and then they're allowed to explore to see what they can come up with on their own. Then they reflect and review. By the end of the unit on Audacity, pupils make a podcast either as a group or individually. They share their podcasts with their peers and parents on Teams.

We take the computing knowledge and skills and weave them into other subjects, as long as by doing so it adds value to learning in that subject. We aim to do the blended approach well, and we work hard to get the CPD right for teachers. Blended learning is an umbrella term. We have found that teachers sometimes worry about whether they are doing blended learning and whether it's worth doing it. There's a lot of professional development that happens behind the scenes before it's got a chance to be embedded. In the Discovery Trust, the blended approach means that about 25% of the time we use technology in lessons.

For example, in a maths lesson we might use Times Tables Rock Stars or another app as a starter. The rest of the lesson would be traditional, and it would be back to the books again. This is thinking about what is fit for purpose and making sure that it adds value to learning. When we are planning, we ask ourselves, 'What will make this lesson purposeful? What piece of tech might help children here?' It's about blending the tech with a well-planned lesson.

In our trust we have a 'whole-class rotation model' which means every child has a device. But this is not always necessary. An alternative approach might be 'station rotation' where groups of pupils have devices in the lesson, while the other pupils are working in their workbooks or doing something practical. Another alternative might be the flipped, in-class lesson. One example would be when the teacher pre-records a lesson for a group of children, and they would access the teaching but via the recorded lesson – the asynchronous lesson. They have their headphones on and listen to their teacher's recording in that part of the lesson. In the meantime, the teacher teaches the rest of the class traditionally. We are finding that teachers who are trialling this are freeing themselves up a bit, and we see this developing further.

There are implications for teacher development and in the Discovery Trust every teacher receives a further two hours of release time in addition to any PPA or leadership time. This has been an investment across the trust, and it means that everyone has a personal development pathway. This is either the ECF or one of the NPQs or some leadership development work, or subject leadership development work. However, there is also a digital learning aspect. Everyone is expected to do some form of professional learning in that TDT, of which digital learning is an important element.

This additional time is available because the trust has centrally sourced and packaged the computing lessons (and we also deliver art to pupils in this way). A further benefit is that if you are an early career teacher for example, and you're watching an expert teach computing or art, it means that you are able to watch the recorded lesson with your mentor, while your own class is being taught. Then your mentor might talk you through why that lesson is strong. The trust has developed a multifaceted instructional coaching – part mentoring, part professional development model.

In terms of the more expensive equipment to support the computing curriculum the Discovery Trust has purchased a whole-trust set of drones, Spheros, micro:bits, VR headsets, and Dash and Dot bots. Every school in the trust gets access to the specialist equipment for about two to three weeks. This means that teachers are able to build in opportunities for pupils to use the additional equipment in their lessons because it has been scheduled in advance.

We have created multimedia hubs to replace IT suites. There are stations of iPads, drones, and Spheros for example, together with a green screen. There is a station for the teacher. We regard this as a three-year piece of work: it's about having a good implementation plan.

One of the things that has become evident, especially with the use of the VR equipment, is the fact that there are many children in our schools who don't have a particularly broad and rich set of experiences outside school. The impact of the pandemic and not being able to go on trips has meant that the VR sets have been able to allow children to experience some places that they've never been to or haven't been able to go to. It has meant that we've been able to enrich the curriculum virtually for those children who have been stuck at home.

What we have found is that the language development and motivation to speak and write because of virtual technology is impressive. It is certainly not just about putting on a headset and waiting and doing games or messing about. It's used strategically to develop other areas of the curriculum by allowing the tech to take the children to places in their imagination or in their virtual experience, that they otherwise wouldn't have been able to go to. Lyfta, for example, is brilliant for taking pupils into communities with rich and diverse human stories. Virtual reality has the potential for huge impact as long as it's not used as a kind of gimmicky, let's just do this on a Friday afternoon because it's fun! It's such a cliché but it really does open the whole world, doesn't it! You can invite anybody in through your screen in your classroom, vetted.

For colleagues who are just starting out, there is plenty of support: Teach Computing or ProjectEVOLVE, and support and training on Google or Microsoft. It is also worth checking the EdTech programme which is free school-to-school support. It is colleague-to-colleague support, and it is very grounded and practical: 'This works for us, but it might not work for you; however this might work instead.' It's sharing ideas and strategies and many schools have really appreciated it and you feel as though you're on a level playing field. As an IT lead, it's important to work with your SLT and plan your road map for each year group and look to see what it is that works for you in your context. Looking at the standards and objectives in the computing curriculum alongside this.

If you can, go to a local school that's doing this and see how they're doing it and take the mystery away from this. And if you're not in a trust, then try and join up with local schools and maybe do similar things, in terms of, especially, purchasing the STEM equipment. The collaboration and the sharing power are the strength of this.

And if you're a Microsoft school there are helpful courses on the Microsoft Educator Center. YouTube can also be a great place for practical examples. In computing, we are not supposed to be these fountains of knowledge at the front of the classroom. It's about being brave enough to say to the children, 'Right, we're going to do this together and we're going to learn through our mistakes.'

There's another way that the technology can help us. We know that many schools are struggling to provide release time for teachers. Yet there are many quick wins if we make good use of the tech. For example,

if we can't be released to go into lessons, then we could ask a colleague to turn their camera on themselves and record their teaching. It then means we can have the conversation based on the recording later. We don't always have to go for the most expensive option of having teachers out of class, which is expensive in terms of release, but also expensive in terms of being away from pupils. It's possible to use tech in such an intelligent way: you don't need to watch the whole hour of the recording. For example, the teacher might say, 'You know when I was doing this, it would be helpful to have some feedback,' or 'How did this bit go?' Working in this way means that we can leverage the tech to add value to our professional learning.

We believe it is important to keep the momentum going. The trust has blended learning champions, but it could be a specialist in school who is either an IT lead, or somebody who's doing it well, and is happy to share their experience and ideas. The blended learning champions in the schools in our trust inspire colleagues and build confidence. In staff meetings SLT have built in 10 minutes at the start. This is an opportunity for the blended learning champion, or another member of staff to say, 'This is what we've learned this week, this is what I used, this worked well but this didn't, give it a go.' From teacher to teacher that's now cascaded out because the people and the light touch systems are there.

All the teachers who have gone through this process say, 'Have a go, just be brave and pick it up and just do it. If it goes wrong, don't worry about it, but persevere and keep going with it because it's the only way through.' It's important to reassure colleagues that they will not have to get up to speed overnight. This work is going to happen over time, and we regard it as a three-year journey. Just make sure that it is purposeful and that it is going to benefit children's learning.

Computing: background

It is worth quoting the purpose of computing in the national curriculum programme of study:

> 'A high-quality computing education equips pupils to use computational thinking and creativity to understand and change the world. Computing has deep links with mathematics, science and design and technology, and

> provides insights into both natural and artificial systems. The core of computing is computer science, in which pupils are taught the principles of information and computation, how digital systems work and how to put this knowledge to use through programming. Building on this knowledge and understanding, pupils are equipped to use information technology to create programs, systems, and a range of content. Computing also ensures that pupils become digitally literate – able to use, and express themselves and develop their ideas through, information and communication technology – at a level suitable for the future workplace and as active participants in a digital world.
>
> 'The national curriculum for computing aims to ensure that all pupils: 'can understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation; can analyse problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems; can evaluate and apply information technology, including new or unfamiliar technologies, analytically to solve problems; are responsible, competent, confident and creative users of information and communication technology.'[1]

Once the importance statements have been revisited, it is helpful for subject leaders and co-ordinators to discuss and agree with colleagues the reason why their subject, in this case computing, is important for the pupils in their school. One way of doing this is to draw on a quote, in this case from George Dyson: 'Alan Turing gave us a mathematical model of digital computing that has completely withstood the test of time. He gave us a very, very clear description that was truly prophetic.'

1 Department for Education. (2013) *National curriculum in England: computing programmes of study*. Available at: https://www.gov.uk/government/publications/national-curriculum-in-england-computing-programmes-of-study/national-curriculum-in-england-computing-programmes-of-study (Accessed: 7 February 2022).

This kind of prompt allows us to formulate our way of stating the importance of the subject. We might agree or disagree with such a statement and in doing so come to a form of words which expresses our view of the importance of this subject, in this school. This moves us away from the territory of 'we teach this subject because of the SATs or GCSEs'. While the external tests and exams are important, they are not the totality of the subject.

Professional communities

Subject associations are important because at the heart of their work is curriculum thinking, development and resources. The subject association for computing is Computing at School and it should be the case that any member of staff with responsibility for a subject should be a member of the relevant subject association, and this should be paid for by the school.

Twitter subject communities are important for the development of subject knowledge because it is here that there are lively debates about what to teach, how to teach and the kinds of resources that are helpful. For computing it is worth following Computing at School @CompAtSch and the hashtag is #CASChat.

Links

Southwest Grid for Learning – https://swgfl.org.uk/projects/barefoot/
Teach Computing – https://teachcomputing.org
Wonder Workshop – https://www.makewonder.com
Scratch – https://scratch.mit.edu
Paint – https://blogs.windows.com/windows-insider/2021/09/28/redesigned-paint-app-for-windows-11-begins-rolling-out-to-windows-insiders/
Kahoot! – https://kahoot.com
Tapestry – https://tapestry.info
Sway – https://sway.office.com
OneNote – www.onenote.com/?404&public=1
Audacity – www.audacityteam.org
Flipgrid – https://info.flipgrid.com
Ten quick tips for teaching programming – https://journals.plos.org/ploscompbiol/article?id=10.1371%2Fjournal.pcbi.1006023

Computing at School – www.computingatschool.org.uk
Barefoot Computing – www.barefootcomputing.org
Code Club – https://codeclub.org/en/
CoderDojo – https://coderdojo.com
Raspberry Pi – https://www.raspberrypi.org/teach/
Hello World: Magazine for Computing and Digital Making Educators – https://helloworld.raspberrypi.org/issues/4
Computer Science Teachers Association – www.csteachers.org
Digital Schoolhouse – www.digitalschoolhouse.org.uk/resources
Times Tables Rock Stars – https://ttrockstars.com/
Lyfta – https://www.lyfta.com/
ProjectEVOLVE – https://projectevolve.co.uk
EdTech – https://edtechdemo.ucst.uk/
Microsoft Educator Center – https://education.microsoft.com/en-us