SAPIENTIA

From ICT for Education

Everything you need to know about Computing, the curriculum, and the classroom.

Welcome to the first edition of ICT for Education's Sapientia newsletter, a publication designed to deliver thought leadership, practical innovation, profiles of leading educational practitioners and more to our community of teaching and education professionals.

This inaugural issue of Sapientia is led by **Miles Berry, Professor of Computing Education at the University of Roehampton**, and a contributor to a wide range of computing projects, including the computing programmes of study in the National Curriculum, Barefoot Computing and Switched On Computing.

Berry provides a debrief on the latest Ofsted Research Review on Computing, highlighting its challenges and opportunities, and perhaps most importantly, providing a number of positive conclusions drawn from the review and including Ofsted observations that Computing should be an entitlement for all up to the end of Key Stage 4, deserves the curriculum time needed to do it justice, and that Computing teachers should be entitled to subject specific professional development.

This is an Ofsted review, but with the weight of concern carried by the teaching profession about how Computing can be addressed in schools that are frequently short of resources, it could also be a welcome platform for development.

Miles is joined in the newsletter by **Martin Bailey, Digital Enrichment Leader at Lanchester EP Primary School in County Durham**, and a recognised innovator of classroom and school solutions. In this edition of Sapientia, Bailey discusses the potential benefits of bringing QR codes into the classroom. He will, no doubt, be back with further practical approaches to teaching and learning in future issues of the newsletter.

To keep pace with the changes, challenges and opportunities in the primary and secondary education sectors, register for ICT for Education's termly newsletter here
il@ictforeducation.co.uk

You can also find out more about best practice approaches to the Computing curriculum, practical solutions for schools, and useful products and services by registering to attend an ICT

for Education conference or seminar. We are at Roehampton University in January, Sussex University in February, Reading University in April and Carrow Road Norwich in May. For the full 2023 event schedule visit www.ictforeducation.co.uk

It gives me great pleasure to sign off ICT for Education's first edition of Sapientia. I hope you find it useful, along with the many other resources we offer.

Sarah Underwood

Editor - ICT for Education

Ofsted Research Review – Computing

By Professor *Miles Berry*

Ofsted's latest research review for computing looks at what some of the research into teaching and learning has to say about computing as a school subject. Ofsted is upfront about the principles it uses use when selecting the research that's considered in each review, including alignment with cognitive science, the current inspection framework, and a subject-based curriculum.

Provision

Ofsted clarifies curriculum expectations. It emphasises that computing at Key Stage 4 is an entitlement for all pupils in local authority schools, and explains that academies should offer a curriculum of at least equivalent breadth and depth. It supports the view that an hour a week is insufficient to cover the computing curriculum at Key Stage 3 – I would say that heads of department might use this to argue for at least as much time as history or geography are allocated in lower secondary.

Ofsted observes that while access to computer science at GCSE has improved, there remain inequities. These are most obvious in the case of girls choosing to study computer science beyond Key Stage 3. I think there's much that could be done to reinvigorate the content and teaching of the subject: an emphasis on creativity and problem solving could do much to make it more appealing for all pupils, both girls and boys.

Taking the entitlement of all to learn some computing at Key Stage 4, increasing curriculum time for younger year groups, and potentially increasing GCSE class sizes are all well and good, but Ofsted itself acknowledge the challenges in recruiting and retaining computing teachers.

In terms of the EYFS framework, Ofsted interprets it rather narrowly, missing the connection between the characteristics of effective learning in Development Matters and the development of computational thinking.

Curriculum

Ofsted sees the curriculum as developing declarative and procedural knowledge across digital literacy, IT and computer science, with the skillful use of technology being underpinned by both types of knowledge. While the need for a 'knowledge rich' curriculum in computing is clear, I am not sure there is enough regard here for the practical nature of computing.

The report acknowledges the centrality of programming to computing, while recognising that this is particularly difficult, due to its demands on working memory. Ofsted advises helping pupils develop their mental models of computation, as well as scaffolding the organisation of this knowledge.

Ofsted expresses a surprising degree of scepticism about block-based programming, such as in Scratch. It takes the view that the choice of language should be determined by the aims of the curriculum, rather than by what is right for each pupil. A more learner-centric position would be to continue with more accessible, and perhaps more engaging, block-based programming until the foundational constructs of programming are so well understood that the additional working memory demands of text-based syntax are unproblematic.

The review's section on computational thinking is underdeveloped, which is a shame as I think many teachers would benefit from sound advice here. A clear framing of computational thinking as the search for automatable solutions to problems would help, and move computational thinking away from vague, generic skills.

Pupils' engagement in computing is likely to follow its application to contexts which they find meaningful. These could be links to other subjects taken from interesting, real-world problems, or open-ended projects, perhaps with a creative focus or linked to making others' lives better. The review acknowledges the role of contexts in teaching computing, but its examples might be rather less engaging than, for example, gaming, 3D animation and digital photography.

Ofsted is right to introduce a note of caution around the idea of the 'digital native', urging teachers not to make assumptions about pupils' technology skills. While the breadth of computing at GCSE is ill-served by current qualifications, Ofsted also affirms a need for a broad curriculum covering digital literacy and IT alongside computer science.

Pedagogy and assessment

Ofsted's review advocates explicit instruction, at least for novices, emphasising the need for new ideas to be taught clearly, rather than expecting pupils to discover these for themselves. It also

emphasises the power of worked examples in teaching computing, including the use of 'sub-goal labelling', where the teacher explicitly identifies the stages in problem solving. The popular PRIMM (predict, run, investigate, modify, make) approach to programming is only mentioned in the bibliography, among other references to learning programming being difficult.

Pupils' activities should be aligned with the objectives of the lesson: planning should begin with what pupils should learn, rather than what they should do. Ofsted acknowledge the power of storytelling, and how this can link abstract ideas to concrete examples. It also advocates the use of textbooks, although many teachers remain unimpressed by the quality of current offerings here.

Ofsted also suggests caution in the use of unplugged activities, i.e. those which teach computing concepts away from actual computation, as these can introduce misconceptions and be less motivating for pupils.

Looking at assessment of computing, Ofsted offers limited advice, mentioning the use of multiple choice questions, such as Project Quantum (bit.ly/quantumquestions, free registration required), and Parsons's Problems (coding jigsaw puzzles), but those looking for advice on how to assess the practical aspects of computing would need to look elsewhere.

Ofsted identifies the challenge of teachers' subject knowledge in computing, and the need for sufficient subject-specific professional development. It also recognises the challenge posed by school infrastructure and policies, urging that "perceived risks are weighed up and not used to limit the computing curriculum, unnecessarily denying pupils access to important knowledge and opportunities".

Conclusions

There is much to be welcomed here, particularly in Ofsted's observations that:

- Computing should be an entitlement for all, up to the end of Key Stage 4
- Computing deserves the curriculum time needed to do it justice
- Computing teachers should be entitled to subject specific professional development
- Technology and policies should not get in the way of effective teaching.

I would have liked to see more emphasis on the practical, creative nature of the subject in the report, some advice on how to assess practical computing most effectively, and a recognition that lessons and resources should serve the learner, not just curriculum aims.

Further reading: Seymour Papert's Mindstorms (1980). Papert offers an engaging story of teaching elementary and middle school children to code using the Logo language that he helped to develop. He sets out a vision for programming as a creative form of mathematical discovery and explanation, underpinned by a belief that people learn best through making things to share with others. His insights are as relevant today as they were back in the 1980s

Professor Miles Berry

Miles Berry is Professor of Computing Education at the University of Roehampton. Before joining Roehampton, he spent 18 years in schools, including a period as a head teacher. He has contributed to a wide range of computing projects, including the computing programmes of study in the National Curriculum, Barefoot Computing and Switched On Computing. He serves on the boards of Computing At School, the BCS Academy of Computing, and the National Centre for Computing Education, and is a regular keynote speaker and international consultant on curriculum and professional development. He is @mberry on Twitter and find out more on milesberry.net

A Slow Response to Quick Response

By Martin Bailey

QR codes are everywhere – on television programmes, food packets, menus in restaurants, and more – and have become a common part of our lives. QR, or Quick Response, codes take us quickly to websites and apps without the need to type-in or find a web address, or to search in the app store.

These codes have been in existence since 1994, but it is only since the rise of the smartphone and tablet technology that their use has become more commonplace. The range of ways QR codes are used is increasing all the time and their usage is now so ubiquitous that we rarely go a day without seeing one somewhere.

On the latest devices, the ability to use a phone or tablet's native camera to access QR codes has taken the technology to the next level in terms of use cases – although the education sector is being slow to adopt QR Codes that can save time.

Instant access to websites using QR codes on worksheets or around the classroom is a game-changer, particularly for teachers of younger children. QR codes can also make displays a lot more interactive and, again, save time for teachers. No longer do we need to *'lift a flap to find out about . . .'*

There is also loads of great video content taken and produced in schools. This content tends to be lost quickly as it is not easy to access and view again. QR codes allow you to link the content via a cloud-based storage system and then share it in books or displays, providing a continual audience for the work.

Creating QR codes

As a society, we have realised how easy it is to consume content via QR codes. The problem for education is that most people have not yet realised how easy it is to also create QR codes. There is a certain magical element to QR codes and it seems people think you have to be a computer expert to create them, or that there is a lot of cost involved.

The reality is that anyone can create QR codes free of charge, within a matter of seconds. There are a wide range of free QR creator apps and websites available, and in most cases, you simply copy a URL to the website or file location and press create.

Google Chrome has recently added the ability to easily create a QR code for any website. Simply click on the share icon and then select *'Create QR Code'*. Other common education platforms such as Purple Mash have also added the ability for pupils to create QR codes for their work and for teachers to create virtual display boards linked via QR codes to share pupils' work with a wider audience.

So many industries have adopted the use of QR codes and seen huge benefit. It is time for education to do likewise.


Martin Bailey is Digital Enrichment Leader at Lanchester EP Primary School in County Durham. He also works as a Primary Computing Advisor/Consultant with his own company Animate 2 Educate, and is a lecturer in Primary Computing at Durham University. *You can follow Martin on Twitter @Animate2Educate*, *via his Facebook page Animate 2 Educate, or* visit his website

Martin Bailey

Further reading and useful links
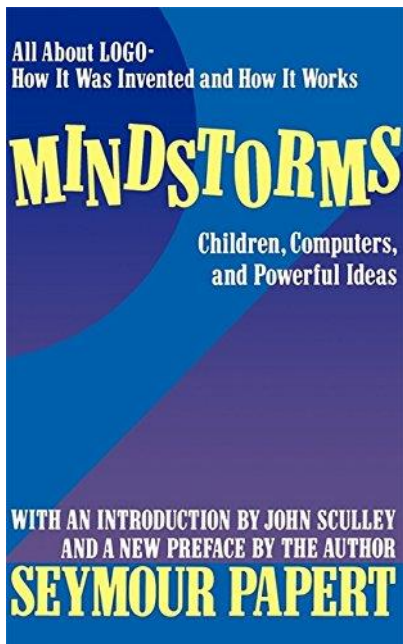
Miles Berry, Professor of Computing Education at the University of Roehampton recommends Seymour Papert's Mindstorms (1980): *"Papert offers an engaging story of teaching elementary and middle school children to code using the Logo language that he helped to develop. He sets out a vision for programming as a creative form of mathematical discovery and explanation, underpinned by a belief that people learn best through making things to share with others. His insights are as relevant today as they were back in the 80s."*
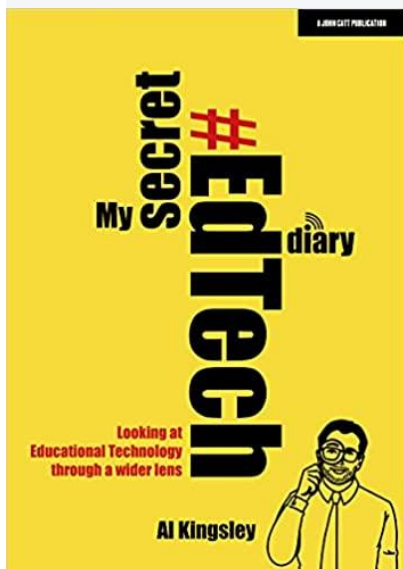
Martin Bailey, Digital Enrichment Leader at Lanchester EP Primary School in County Durham recommends 'My Secret EdTech Diary' by Al Kingsley.

Useful links, Our thanks to **Peter Marshman**, CEO - digit<all> for highlighting some useful links for you to explore:

- Free Primary Computing CPD
- Free Secondary Computing CPD
- Fifi the Llama coding
- Coding activity with a focus on climate
- Girls football coding, inspired by the Lionesses
- Penguin ice skating coding activity

Learn, Share, Enjoy

ICT for Education can help you get the most out of technology in your classroom and in your school. Our free to attend conferences and seminars provide relevant, innovative, informative content delivered by experienced, knowledgeable, respected speakers able to relate to and understand the challenges faced by those responsible for giving learners the best opportunities in life.

Attend a Conference   ## Attend a Seminar

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Manchester -12/10/2023

Sussex - 28/02/2023

Reading - 25/04/2023

Manchester - 23/05/23

Southampton - 04/07/2023

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✉ Forward