Think again

Computational skills need to be reflected in curricula and practice, writes *Marc Faulder* in the first part of a new series on teaching computational thinking in the early years

PHOTOS ADOBE STOCK

Part of the challenge for any education system is to equip children with the skills that they will one day need in the world of work. Predicting job requirements is never easy, but what seems indisputable is that 'coding' and 'computational thinking' will become essential skills for a vast array of jobs – not just in the Silicon Valleys of the world but across all sectors from health to retail.

The extent to which education systems are failing to keep pace with requirements is seen in the current skills gap, with the demand for computer programmers and software developers far outstripping the number of people who understand the concepts of coding – a problem that is being felt across Europe and the rest of the world (Schoolnet, 2015).

As with so many other skills, the nursery years are seen as an ideal time in which to lay the foundations for computational thinking. And there is good news here, particularly for those with concerns about young children's exposure to digital technology. These skills link directly with the Characteristics of Effective Learning and can be supported within play-based 'enabling environments', perhaps with only tweaks to current practice rather than wholesale change. They don't even need to involve computers.

CODING AND THINKING

'Coding', put simply, is the process of creating step-by-step commands for a computer to follow, so that it does what you want it to do. 'Computational thinking', by contrast, is the thinking skills needed to be a good coder – a higher-order skillset that enables a person to approach tasks and problem-solving in a logical, coherent way; the very skills that are promoted under the Characteristics of Effective Learning.

Computational thinking includes:

- logical reasoning – predicting and analysing skills
- spotting patterns – finding and using similarities
- decomposition – breaking down problems into smaller parts
- debugging – finding and fixing errors, changing strategies
- evaluating – making judgements
- tinkering – time to explore

(Sargent, 2016).

PRIMARY AND EYFS CURRICULA

Just as these computational skills mirror the changing landscape of technology, so they will need to be reflected in curricula and practice. This may require a shift in thinking among educators. Rather seeing technology simply as a tool for children to 'consume' information, the emphasis will need to be on 'creation' – children using devices to create, share, present and evaluate what they are learning (see box).

MORE INFORMATION

- Marc Faulder will be one of the leading early years experts speaking at the Nursery World Show in London on 2 and 3 February 2018. His seminar will look at how voice and image recording technology can empower children to extend, record and reflect on their learning.

To see the full seminar and masterclass programme, visit: www.nurseryworldshow.com/london

England is well advanced in delivering a primary curriculum that is fit for purpose. In 2015, it was the only one of 13 European countries that had integrated computational thinking into its national curriculum – with Finland and Belgium about to follow. And it was one of only two countries with coding as a compulsory part of its primary curriculum (European Schoolnet, 2015).

The computing programme of study within the primary national curriculum aims to develop the next generation of coders by helping children to:

- identify complex problems
- separate problems into manageable tasks
- give clear and efficient commands
- predict outcomes
- test what happens and fix what goes wrong.

The Early Years Foundation Stage framework, however, has failed to keep pace with the changes. Guidance is limited and even under the revised

EYFS, the early years goal for technology – within Understanding the World – sees children only as passive consumers rather than active creators of information: 'Technology: children recognise that a range of technology is used in places such as homes and schools. They select and use technology for particular purposes.'

'Consequently,' notes Lorraine Kaye in *Young Children in a Digital Age*, 'there is now potential for a marked discontinuity between the recent curriculum in the Early Years Foundation Stage and that in Key Stage 1.'

BEST PRACTICE

If early years practitioners are to address this discontinuity, then their starting point for EYFS practice must be not the early learning goal but the Characteristics of Effective Learning.

These are supposed to equip our children with the skills and attitudes that they need to be lifelong learners, independent enquirers and critical thinkers. We want to see children engaged and active in their learning but most importantly, see them creating, making connections and choosing ways to approach problems.

In the 'Creating and Thinking Critically' strand, children should:

- have their own ideas
- make links by developing ideas of grouping, sequencing, cause and effect
- make decisions about how to approach a task
- change how well their activities are going.

So, rather than taking a narrow view of how to use technology within the Specific area of Understanding the World, we need to take a holistic approach – building across our 'enabling environments' a framework for critical thinking, problem-solving and evaluation and making cross-curricular connections between technology and learning.

Computational thinking skills can be promoted without digital technology, but what we need to appreciate – and not fear – is the synergy between the Characteristics of Effective Learning and computational thinking, and the extent to which 'good' technology can enhance early learning.

MORE INFORMATION

- Get Started with Code, free teacher guides, https://images.apple.com/euro/education/docs/a/generic/Get_Started_with_Code_Curriculum_Guide.pdf
- Everyone Can Code, free curriculum from early years to higher education, www.apple.com/uk/everyone-can-code
- The Barefoot Programme by Computing at School, https://barefootcas.org.uk
- *Computing our future: Computer programming and coding – Priorities, school curricula and initiatives across Europe*, http://bit.ly/2gjOG3J
- Future Work Skills 2020, www.iftf.org/futureworkskills
- www.wired.com/2017/02/programming-is-the-new-blue-collar-job
- 'Let's explore... computational thinking' by Marianne Sargent (16 May 2016), www.nurseryworld.co.uk

Current research has identified many benefits, writes Lorraine Kaye, among them:

- improved cognitive development
- gains in creative thinking and problem-solving
- progress in language skills (Kaye, 2017).

For example, adding technology such as apps that record voice, like ChatterPix, to an activity may engage the more reluctant speakers. Supporting the child's language development – not the technology – remains the learning priority for the practitioner, but it is the technology that enhances the activity, and the learning.

Over the coming parts of this series, the concepts of computational thinking and the skill of coding will be mapped against aspects of learning across the EYFS curriculum to show how children's learning can be enhanced by computational thinking methodologies:

Pattern spotting: pattern-making materials; sequencing stories.

Decomposition: maps and route-planning; recreating models from plans; planning an event such as a picnic.

Logical reasoning for cause and effect: floating and sinking; ramps and cars; waterproofing dens.

Algorithmic thinking: Making sandwiches or cakes, writing and following instructions. Algorithmic thinking will also explore how the concepts of computational thinking link to the skills needed to be a great coder. Devices, apps and non-digital resources to support this will be explored.

For many settings, embracing computational thinking will not mean any major changes in practice. As Professor John Siraj-Blachford (2015) points out, early years practitioners are well on their way to adopting a model of computational thinking without even realising it.

The nature of the early years curriculum is enquiry-based and the Characteristics of Effective Learning are shaping the skills needed to be a great coder. All that's left is for practitioners to make these links explicit in their teaching and children's learning. ■

Marc Faulder is an early years teacher at Burton Joyce Primary School, Nottingham and an Apple distinguished educator. Part two of his series will be published in Nursery World *on 2 October.*

HOME AND NURSERY

Just as educators may have to rethink how children use technology, so too will parents.

Children starting nursery below age-typical development in areas such as communication and language are often said to be spending too much time on devices. Nurseries spend a great amount of time and resources implementing strategies to close these gaps. Yet it continues to be a struggle. Maybe the emphasis should be on the technology skills that children bring to the task, rather than technology per se.

By mapping computational thinking to the Characteristics of Effective Learning, we can model tasks and so empower children as learners, enabling them to become creators rather than simply consumers of information.

If we provide opportunities for children to apply these deeper skills to their use of technology before Key Stage 1, we will be supporting a balance of 'creating' and 'consuming', so enabling children to make better choices on their devices at home.