ICT in the Primary Curriculum in the UK

Overview of ICT in the UK Curriculum:

The following overview over the development of Information and Communication Technology in the UK draws upon several publications, most notably Allen et al. (2007) and Selwyn, Potter and Cranmer (2010).

Due to the technological advancement and development of the World Wide Web Information and Communication Technology became more prominent in the UK in the 1990s. The necessity of ICT within schools became recognised and in the late 1990s increased government funding resulted in wider investments into technology and its teachings. However, at the time the management of this funding remained within the local education authorities, so that some authorities or schools used cutting-edge technology and techniques, whilst others lagged far behind. Also, bigger amounts of investments were allocated to hardware such as whiteboards, laptops for teachers and pupils, and data projectors. Only smaller amounts were used to help train teachers. Teacher training at the time focussed largely on providing teachers with adequate skills and knowledge to ensure they achieved the qualified teacher status. Therefore, training focussed on teachers' high expectations of their pupils, on teachers' abilities to offer opportunities for pupils to develop their ICT skills and on teachers ensuring a purposeful and safe working environment.

At the same time ICT as a subject was reconsidered. Initially, ICT was a separate subject within the curriculum, which meant that pupils learnt to use computers and applied the basics of word processing and spreadsheet software. In the discreet subject lessons pupils had time and space to practise their skills and teachers, too, could develop their teaching techniques and methods. Gradually, some ICT skills and tasks found their way into the general classroom and pupils started to practise Information and Communication Technology implicitly within a wider range of subjects. Pupils used word processing and spreadsheet programmes, as well as painting and drawing software and presentation packages. Programming, coding and graphics software would have been available but never became fully integrated into the curriculum. The increased accessibility to the internet in the early 2000s impacted public expectation, educational policies, the curriculum and ICT as a subject. Teachers were now teaching in a way to keep up with their pupils, whose ICT-skills became better developed than ever before. Children were suddenly confident using videos, cameras and other mobile technology such as tablets and smart phones. Schools and Universities introduced virtual learning environments and subject-specific software, such as music programmes to help link composition to computers.

More recently, experts from businesses and industry have highlighted that young people entering the labour market do not hold the skills required for many of the technological professions and positions available, as graduates are able to use technology, but not to manipulate or work with it. Coders and programmers are required. The UK government responded to these calls by revisiting the ICT curricula within secondary and primary schools. Subsequently, the government introduced a computer science curriculum that includes the basics of algorithms, coding and programming, which, it is argued, will support and train children's logical thinking skills so that children will

benefit across all subjects.

Examples from the classroom

According to the new curriculum, primary school children learn about the basics of algorithms and loops as sets of instructions and repetitive sets of instructions, for example. This basic knowledge is gradually deepened and expanded so that within secondary schools pupils learn to use coding tools, programming languages and the principles of Boolean logic.

In practice, many schools rely on the industry to fill the gaps regarding the creation of workable curricula. Currently, hardware and software in use include applications such as Lego Wedo, GarageBand, Purple Mash, Lightbot and Scratch, but also mini-robots, programmable components and mini-computers such as the raspberry Pi and the Beebot.

The Beebot is a mini-robot with programmable elements that requires children to set a sequence for it to run along a specific track on the floor or on a learning mat. Learning mats are either pre-printed or adjustable and so children are encouraged to combine their learning of content such as letters, numbers, storytelling and role-playing with the learning relating to simple programming steps.

Lightbot works in a similar way to the Beebot, but is a software application that can be used on tablets and computers. Also, Lightbot requires children to understand repetitive functions, such as loops, if they are to complete the set levels.

Beebot and Lightbot are popular with teachers, parents and children alike. Due to the immediate responses children see quickly where they go wrong. Many children struggle initially with the "turn" command, which is literally just a "turn" rather than a "turn and move".

Scratch is a software programme, which allows children to create their own games, animations and interactive stories using a simplified programming language. The online community function allows for sharing and viewing projects, but offline editor options are also available, which is why Scratch is often recommended for parents to install on their home computers for children.

In addition to the actual programming tools, software and hardware, schools also rely on curricula developed by specialists in order to support teaching. One of the most popular series is "Switched on Computing", which offers materials, videos and examples for classroom use.

The teaching reality

Anecdotally, teachers report that engagement and motivation improves with the use of ICT. However, research into the effects and benefits of technology on learning is limited. Recent studies into ICT within education show that banning the use of technology improves examination results (Beland and Murphy, 2015; Carter, Greenberg and Walker, 2016), whilst increased screen-time due to watching TV, surfing the net or gaming activities decreases examination results (Corder et al., 2015). An OECD report also highlighted that the increased use of and accessibility to technology, computer and the internet had not resulted in better levels of literacy and numeracy (OECD, 2015).

In May 2014 YouGov carried out a survey of 788 teachers regarding the implementation of the new ICT curriculum with UK. The results show that around 50% of ICT teachers in UK primary schools are not confident teaching the new curriculum and that staff are under-skilled and under-trained.

I have undertaken qualitative questioning of 19 teachers from a range of schools. These teachers' responses mirror the above mentioned figures but provide a more nuanced picture. The teachers were from local authority schools, government and independent schools, pure primary and all-through or middle schools, faith schools and UK schools as well as an international school.
In 77% of these schools the set-up is such that an ICT coordinator oversees the provision of computing across the school, but the class teachers are taking the lessons and teach the curriculum.

Largely, teachers feel positive about the changes to the curriculum. Teachers feel that with the inclusion of coding and programming, children are encouraged to develop their thinking skills and creativity, which could potentially bring benefits across all subjects. Overall, more than three quarters of the interviewed teachers highlighted some advantages regarding the new curriculum, expressed interest for the subject and positively evaluated the structure that the new curriculum provided for the ICT provision within schools. For example, Teacher 19 states that "the addition of coding has been difficult but very exciting. I love it because quite often the children who struggle with lots of things in school really excel at coding".

However, 55% of the teachers interviewed raised concerns regarding lack of training, lack of time and lack of resources. For schools to be able to deliver programming and coding using Beebots and Lightbot as seen above the materials need to be bought, and in schools that are already suffering from funding cuts, such resources add additional pressure to strained budgets. Several respondents asserted that radical changes to the curriculum require more support from the government. More than two thirds of the respondents stated that more training is required if teachers are to be confident and competent regarding their own ICT skills. This is particularly important because for many teachers computing is associated with "lots of difficulties (...as they themselves) never did computing at school" (Teacher 12). Teachers predict that if the government does not provide adequate funding and support the new curriculum and the initiatives around it, are bound to fail (Teacher 9), particularly as "non-specialist ICT teachers spend a lot of time treading water" (Teacher 13). For many, the implementation of the new curriculum "has meant self-teaching new programmes" (Teacher 19).

Teacher 3 summarises the common frustration that "primary teachers are expected to be experts in everything" and goes on to say "I can just about make my way around ppt (powerpoint) and word. I am extremely under confident, under skilled and under experienced to even be able to understand what half the new ICT curriculum means, let alone teach it."

Another interesting finding from the research relates to general computing skills. Teachers mention that coding may have taken too much of a priority over general computing skills and

digital literacy: many children "can't save a document at the start of Year 5" (Teacher 2) and "cannot use Excel and Word and lack typing skills" (Teacher 15); "word processing has been forgotten about and it has been assumed that children will be good at this due to the availability of devices but this is not the case (Teacher 16); the "heavy focus on computing leaves huge gaps in basic skills like file management and MS office" (Teacher 13); "pupils can code but are unable to close single tabs on internet explorer" (Teacher 13).
When asked about their ideal ICT curriculum teachers mentioned that "unplugged work", e-safety, typing and computational thinking skills ought to be at the core, so that children gain better understanding of the wide range of application of computing skills in real-life contexts. Teacher 16's response summarises the common sentiments: the core principles for an ICT curriculum should be "to know what to do when something goes wrong; to retrieve, edit and save information; to use a range of devices for a range of purposes; to use imagination and creativity to design, research and develop new skills".

A look to the future

As many of the teachers' responses demonstrate, computing skills and ICT must be developed carefully if the next generations of children are to succeed in their lives. However, for a new curriculum to be successful basic requirements, such as sufficient funding and support must be met; particularly so as for many teachers in my research the main challenge lies with lack of confidence amongst teaching staff.

Also, the wide range of applications of ICT will need to be considered more carefully. It may be that digital literacy and computer science will need to be separated with both taught by subject specialists.

In the current climate within UK primary schools, where assessment frameworks and curricula are subject to radical changes, the implementation of a new ICT curriculum is perhaps not given the consideration it should be. Within the UK's educational system, children are formally tested at several stages throughout their primary schooling for quality assurance purposes. In reality, however, the test results inform league tables of schools, which in turn influence the schools' popularity and subsequently the funding of a school. Therefore, in practice, primary schools focus on key content and subject knowledge, rather than the wider development of children, and currently, ICT is not one of those core subjects. Teachers and the industry acknowledge the relevance of computing as a life skill, and so in future will continue to teach the basic foundations of handling computers and programming language. Teacher 2's response is probably best to indicate the future of ICT within the curriculum: "the move to children creating content is the most significant – rather than being passive users, the onus is on creating (...) and solving problems".

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