

Ofsted Research Review - Computing

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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 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 acknowledges 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.