

COMPUTING

Key Concepts

‘Computing is concerned with how computers and computer systems work, and how they are designed and programmed. Pupils studying computing will gain an understanding of computational systems of all kinds, whether or not they include computers. Computational thinking provides insights into many areas of the curriculum, and influences work at the cutting edge of a wide range of disciplines.

Why is computational thinking so important? It allows us to solve problems, design systems, and understand the power and limits of human and machine intelligence. It is a skill that empowers, and one that all pupils should be aware of and develop competence in. Pupils who can think computationally are better able to conceptualise, understand and use computer-based technology, and so are better prepared for today’s world and the future’
(Computing at School report, 2013 – see link below)

Key concepts that run through this subject include:

- **Computer Science** - the ideas and principles that underpin how digital technology works. This covers the key aspect of programming which is best way to support primary aged children to understand what computer science is.
- **Information Technology** - Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information
- **Being Digitally Literate** - Understand the opportunities [networks] offer for communication and collaboration. Be discerning in evaluating digital content. Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact (this incorporates e-safety)

Specific pedagogical considerations

- Computing is a subject that lends itself to an enquiry-based approach. Once you have taught the knowledge and vocabulary needed for the subject, children will be able to solve quite complex problems.
- You can ask children to develop their own problems. Once children have solved a number of debugging problems, it can be useful to ask the children to come up with their own ‘What if’ questions.
- E-safety is more than just a lesson. It should be taught across the year and revisited as particular issues arise. There are many links with safeguarding and the PSHE curriculum. Make sure the children are aware of these links and that they have all the information they need to make decisions. It is important to engage parents in these conversations.
- Think about how knowledge and skills can be developed by reduced cognitive load. Think about using children’s prior knowledge and breaking down the lesson using guides, scaffolds and worked examples. Giving time to explore new software can help to develop children’s intuition to have a go at something but this may not be inclusive for children who do not have prior knowledge or experience of using similar software.

What does it look like in EYFS?

In the recent update to the EYFS curriculum in September 2021, the Technology strand has been removed. Computing skills should still be taught in the EYFS classroom and teachers need to plan the use of technology across the curriculum. This can help children to see how technology is integrated in the continuous provision. It is also important for children to understand how technology is used in their everyday life including the use of household appliances, interactive toys and to support learning.

National Curriculum Purpose of Study and Aims

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.

Aims

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

Further questions for reflection

- How are you teaching the problem solving techniques around computing? Are you just relying on some children being more confident than others?
- How can you engage parents in discussions around e-safety – this includes the use of social media?
- How do we support children to make choices about the amount of time spent on devices?
- How can the time spent and skills developed working with devices virtually at home be utilised and built on in the classroom?

What might progression look like? What do look out for and emphasise in your teaching

- Children need to see how they are developing their use of particular software and hardware. A school needs a clear progressive curriculum that means that children are building on the knowledge and skills. Some children, particularly with programming, use one piece of software (e.g. Scratch). It is important there is a clear progression of how this is used. Ensure that children master this progression at each stage and do not go further through the progression for future year groups. They may have the knowledge and confidence to do this but it may mean they become bored or disengaged later in the school.
- Don’t take for granted that children are able to type and use a mouse confidently. Many children now access devices using a touch screen. The teaching of typing efficiently on a keyboard and the use of a mouse needs to be taught explicitly within the curriculum.

Key misconceptions and specific issues to be aware of:

- There can be many misconceptions from teaching staff in this area of the curriculum as they may not feel confident in their subject knowledge. It is important that schools support staff with a clear scheme of work or access to appropriate resources/training. See the Resource links below for support.
- Children think that computing is just playing games and do not see that they are learning key knowledge and skills that can support them with problem solving. It is important that children see this subject as being a project. They have a clear outcome and the structure of lessons supports them to develop the knowledge and skills required for this.
- When using information technology within lessons (i.e. searching the internet, using Word or Powerpoint to present learning), it is important that children have been taught the knowledge and skills needed. This can sometimes have a negative impact on achievement and progress as children have not got the knowledge and skills to use this software confidently. Some children will be confident using these as they will have used these at home but others will find it more difficult.

Resource links

Teach Computing: a useful set of free resources

TTS computing resources: useful resources that schools may have access to.

Hanbury Primary School - useful links to websites that can be used in school and at home

Key questions when observing or teaching this subject

What prior knowledge do the children have?

How is the key vocabulary taught and expected to be used by the children as they learn?

Do children have an understanding of e-safety appropriate to their age? How do you know?

How is the learning building on prior knowledge?

How will this learning support future learning within the school’s curriculum framework?

Have the children mastered the prior knowledge and skills required to build their mental model?

Further reading

Computing at School: a very useful document setting out some of the key concepts of computing in schools

Oxford Owl – overview of the National Curriculum for Computing

Ofsted Research Review: May 2022

Primary Computing and the Ofsted Framework – a useful summary video

Bell, T. and Duncan, C. (2018) **Teaching Computing in Primary Schools** in Sentance, S., Barendsen, E. and Schulte, C. Computer Science Education. London: Bloomsbury