

Developing an approach to teaching and learning in Computing

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.

DfE 2013

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.

By the end of each key stage, pupils are expected to know, apply and understand the matters, skills and processes specified in the relevant programme of study. Children are assessed against school criteria at the end of the unit project. They make progress over time as they deepen understanding.

Our expectation

- Teachers follow the Teach Computing scheme and overview for learning, ensuring that all topics are covered
- Teachers plan appropriately by being familiar with the subject knowledge, lessons and resources outlined in the prepared plans
- Children experience a range of computing programs and devices as suggested in the unit overviews
- Online Safety is taught explicitly during enrichment days and within units
- Teachers use effective feedback and assessment to support learning and understanding
- Children use Google Classroom and the Google Suite to capture their learning

Implementation

There is no set time that Computing should be taught however the children must have suitable time to practise and apply the objectives of the Whole School Overview. Computing may be taught in weekly lessons or blocked to give sustained time with the equipment.

Impact

Each lesson plan has guidance for formative and summative assessment opportunities. Almost all units have a summative task where children can demonstrate their learning. Teachers should use both formative and summative assessments to make an overall assessment within 'Insight Tracking'.

Special Educational Needs or Disability

Children who have SEND should be provided with adaptations to the curriculum that will enable them to achieve the unit outcomes. Many lesson plans include *scaffolding opportunities* which are suggestions for adjustments to the curriculum for learners who might find it difficult to access the lesson.

Computing overview of learning

Wormley will follow the *Teach Computing* scheme, designed by the National Centre for Computing Education, to meet the statutory curriculum requirements and develop a curiosity of new technologies. The content has been created by subject experts, based on the latest pedagogical research and teacher feedback. It also provides an innovative progression framework where computing content (concepts, knowledge, skills, and objectives) has been organised into interconnected networks called learning graphs. The scheme includes computer science, information technology, digital literacy, and the safe and appropriate use of technology.

The Computing curriculum is structured into units for each year group, and each unit is broken down into lessons. Units can generally be taught in any order, with the exception of programming, where concepts and skills rely on prior knowledge and experiences. Lessons must be taught in numerical order.

Computer Science

The scheme has a dual emphasis. It is designed to support children in becoming safe, competent and creative users of technology, building essential skills and understanding through using a range of applications on varied devices. At the same time it inspires them to become productive creators and designers of technology, by introducing the essential aspects of computer science in a way which blends with the ethos and learning approaches of the primary phase. There is a particular emphasis on unplugged approaches, which enable learners to understand how technology and systems work and are controlled, before using any computer-based applications. The **computer systems & networks, data and coding** strands particularly include aspects related to computer science, but there are many elements embedded into other themes, so that this learning can be explored in varied contexts.

The strands

Internet safety and appropriate use	<p>This aspect is an essential element of the scheme and is embedded across all strands and is taught explicitly during theme days or weeks.</p> <p>Become safe, effective and respectful users of technology and online systems, recognising both acceptable and unacceptable behaviour and knowing how to respond when they have concerns. Respect copyright and ownership, asking permission before using materials and crediting sources. Understand the need to keep their personal information secure and recognise the need to respect the rights of others to personal privacy.</p> <p><i>The children will:</i> experience general safe use of the computer; explore what to do if children find something that makes them feel uncomfortable; identify a range of ways to report concerns about content and contact from others; understand dangers of sharing personal information and importance of privacy; explore avatars and pseudonyms to protect identity; strangers online; understand the dangers of talking to strangers online through email, text, social media and gaming; consider how they know people are who they say they are? understand how to be safe when web browsing and not to always trust the information you see on websites (phishing, spam, scams, virus', pop ups; recognise acceptable and unacceptable behaviour online; understand the different forms of Cyber bullying including being a bystander; defaced images; identify rules of social media e.g. legal age; understand how to use social media safely respectfully; explore possible dangers that could arise when using social media.</p>
--	---

<p>Computer systems and networks</p>	<p>This unit develops the children’s understanding of technology and how it can help them. They explore how information technology (IT) is being used for good in our lives. Children will develop their understanding of digital devices, networks and computer systems and how information is transferred between systems and devices. They will apply their knowledge and understanding of networks recognising the internet as a network of networks which need to be kept secure. They will learn about the World Wide Web as a communication tool, learning the importance of responsible use of technology, and how to make smart choices when using it. By the end of KS2 they will evaluate online content to decide how honest, accurate, or reliable it is, and understand the consequences of false information.</p>
<p>Creating media</p>	<p>Children begin by exploring the world of digital art through painting programs. Learners will familiarise themselves with typing on a keyboard and begin using tools to change the look of their writing. The children will learn to recognise that different devices can be used to capture photographs and will gain experience capturing, editing, and improving photos. They will explore digital music and how to create it. Learners will use a range of techniques to create a stop frame animation using tablets. The children will explore digital publishing becoming familiar with the terms ‘text’ and ‘images’ and understand that they can be used to communicate messages. They will also evaluate how and why desktop publishing is used in the real world. They will examine devices capable of recording digital audio, which will include identifying the input device (microphone) and output devices (speaker or headphones). Learners will develop their understanding of how digital images can be changed and edited and have an opportunity to learn how to create short videos in groups. By the end of KS2 learners will create a website, find out that vector images are made up of shape and develop their knowledge and understanding of using a computer to produce 3D models.</p>
<p>Coding</p>	<p>The children are introduced to programming and algorithms through robots and ScratchJr. Pupils develop their understanding of instructions in sequences and the use of logical reasoning to predict outcomes. They will be introduced to a selection of motion, sound, and event blocks which they will use to create their own programs that explore the links between events and actions. The children will look at repetition and loops within programming and use Logo, a text-based programming language. Learners will use physical computing to explore the concept of selection in programming through the use of the Crumble programming environment. Learners will be introduced to a microcontroller (Crumble controller) and learn how to connect and program components (including output devices- LEDs and motors). By the end of KS2 they will learn how the If... Then... Else structure can be used to select different outcomes depending on whether a condition is true or false.</p>
<p>Data</p>	<p>Pupils are introduced to the terms data and information. They are introduced to the idea of assigning data (images) with different labels in order to demonstrate how computers are able to group and present data. Learners will use the data presented as pictograms to answer questions. The children will develop their understanding of what a branching database is, how to create one and how to evaluate effectiveness. Pupils will consider how and why data is collected over time focussing on data logging. The children move on to look at how a flat-file database can be used to organise data in records. They create graphs and charts from their data to help solve problems. By the end of KS2 earners use spreadsheets, create graphs and charts then evaluate their results in comparison to questions asked.</p>

Computing Units

	Computing Systems and Networks	Creating Media	Coding	Data
Y1	Technology Around Us	Digital Painting	Moving a Robot	Grouping Label
Y2	Information Technology All Around Us	Digital Photography	Robot Algorithms	Pictograms
Y3	Connecting Computers	Stop Frame Animation	Sequence in Music	Branching database
Y4	The Internet	Audio Editing	Repetition in Shapes	Data Logging
Y5	Sharing Information	Video Editing	Selection in Physical Computing	Flat File Databases
Y6	Communication	Web Page Creation	Variables in Games	Spreadsheets

