Stower Provost Community School

Curriculum drivers
The curriculum is underpinned by the school's Curriculum Drivers: Engage, Develop, Innovate and Express. The spiritual, moral, social and cultural development of our pupils and their understanding of the core values of our society are woven through the curriculum.

Computing Curriculum Statement

Ownership	LB
Created	October 2021
Approved by Governors	
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To be reviewed	

Contents

1. Curriculum Statement

Intent

In line with the 2014 National Curriculum for Computing, our aim is to provide a high-quality computing education which equips children to use computational thinking and creativity to understand and change the world. The curriculum will teach children key knowledge about how computers and computer systems work, and how they are designed and programmed. Learners will have the opportunity to gain an understanding of computational systems of all kinds, whether or not they include computers.

By the time they leave Stower Provost Primary Community School, children will have gained key knowledge and skills in the three main areas of the computing curriculum: computer science (programming and understanding how digital systems work), information technology (using computer systems to store, retrieve and send information) and digital literacy (evaluating digital content and using technology safely and respectfully). The objectives within each strand support the development of learning across the key stages, ensuring a solid grounding for future learning and beyond.

Implementation

At Stower Provost, computing is taught in units on a weekly basis. Children will develop depth of knowledge and skills over the duration of these computing units. Our computing curriculum is built around an innovative progression framework where computing content has been organised into interconnected networks. The Teach Computing Curriculum uses the National Centre for Computing Education's computing taxonomy to ensure comprehensive coverage of the subject. This has been developed through a thorough review of the KS1–4 computing programme of study, and the GCSE and A-Level computer science specifications across all awarding bodies. All learning outcomes can be described through a high-level taxonomy of ten strands, ordered alphabetically as follows:

- Algorithms – Be able to comprehend, design, create, and evaluate algorithms
- Computer networks - Understand how networks can be used to retrieve and share information, and how they come with associated risks
- Computer systems - Understand what a computer is, and how its constituent parts function together as a whole
- Creating media - Select and create a range of media including text, images, sounds, and video
- Data and information - Understand how data is stored, organised, and used to represent real-world artefacts and scenarios
- Design and development - Understand the activities involved in planning, creating, and evaluating computing artefacts
- Effective use of tools - Use software tools to support computing work
- Impact of technology - Understand how individuals, systems, and society as a whole interact with computer systems
- Programming - Create software to allow computers to solve problems
- Safety and security - Understand risks when using technology, and how to protect individuals and systems

The taxonomy provides categories and an organised view of content to encapsulate the discipline of computing. Whilst all strands are present at all phases, they are not always taught explicitly.

The units for key stages 1 and 2 are based on a spiral curriculum. This means that each of the themes is revisited regularly (at least once in each year group), and pupils revisit each theme through a new unit that consolidates and builds on prior learning within that theme. This style of curriculum design reduces the amount of knowledge lost through forgetting, as topics are revisited yearly. It also ensures that connections are made even if different teachers are teaching the units within a theme in consecutive years.

Impact

The Teach Computing Curriculum has been written to support all pupils. Each lesson is sequenced so that it builds on the learning from the previous lesson, and where appropriate, activities are scaffolded so that all pupils can succeed and thrive. Scaffolded activities provide pupils with extra resources, such as visual prompts, to reach the same learning goals as the rest of the class. Exploratory tasks foster a deeper understanding of a concept, encouraging pupils to apply their learning in different contexts and make connections with other learning experiences. As well as scaffolded activities, embedded within the lessons are a range of pedagogical strategies, which support making computing topics more accessible.

2. **Teaching and Learning**

The computing curriculum is mapped to ensure alignment with the national curriculum content and programme of study. Within the Teach Computing Curriculum, every year group learns through units within the same four themes, which combine the ten strands of the National Centre for Computing Education's taxonomy. This approach allows us to use the spiral curriculum approach to progress skills and concepts from one year group to the next. Children:

- 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.

As part of the introduction to each new unit, teachers review what the children know already and identify what children would like to learn, as mentioned above, to inform the programme of study so that it takes account of children's interests.

In each lesson, children are guided towards the learning intention which is shared at the beginning of the lesson and reviewed by children at the end; this is subsequently used by the teacher during the assessment and review work of children's work and are used to identify individual target areas.

Identified links will be made across the curriculum, where possible and appropriate, to enrich and extend the teaching of other subjects.

3. **Assessment**

Every lesson includes formative assessment opportunities for teachers to use. These opportunities are listed in the lesson plan and are included to ensure that misconceptions are recognised and addressed if they occur. They vary from teacher observation or questioning, to marked activities. These assessments are vital to ensure that teachers are adapting their teaching to suit the needs of the pupils that they are working with, and you are encouraged to change parts of the lesson, such as how much time you spend on a specific activity, in response to these assessments. The learning objective and success criteria are introduced in the slides at the beginning of every lesson. At the end of every lesson, pupils are invited to assess how well they feel they have met the learning objective using thumbs up, thumbs sideways, or thumbs down. This gives pupils a reminder of the content that has been covered, as well as a chance to reflect. It is also a chance for teachers to see how confident the class is feeling so that they can make changes to subsequent lessons accordingly.

4. **Planning and Resources**

Planning will be the responsibility of the class teachers and, where needed, support from the subject leader will be available.

The rolling programme ensures a balanced and developmental coverage of the Computing Curriculum. All of the medium-term plans and lesson plans can be accessed via SharePoint or the Teach Computing website at https://teachcomputing.org/curriculum.

iPads

Each teacher has an iPad for assessment purposes and there is a trolley of iPads for use within the classroom to support the programme of study.

Laptops

Each teacher has a laptop which is network connected and has access to SharePoint for planning and preparation. There is also a trolley of laptops for use within the classroom to support the programme of study.

Interactive Whiteboards

Each classroom has an interactive board linked to the class laptop.

Other Resources to support the curriculum

- Beebots
- Crumble
- Log-boxes
- Headphones
- Micro:bits

5. **Organisation**

The children have a weekly computing session and will study a unit of computing each half-term. Each unit is mapped out on the school's long-term plan.

6. **EYFS**

Within the new EYFS Framework, there are no specific Computing objectives to cover. However, the table below outlines the most relevant statements taken from the Early Learning Goals in the EYFS statutory framework and the Development Matters age ranges for Three and Four-Year-Olds and Reception to match the programme of study for computing.

Computing			
Three and Four-Year-Olds	Personal, Social and Emotional Development		• Remember rules without needing an adult to remind them.
	Physical Development		• Match their developing physical skills to tasks and activities in the setting.
	Understanding the World		• Explore how things work.
Reception	Personal, Social and Emotional Development		• Show resilience and perseverance in the face of a challenge. • Know and talk about the different factors that support their overall health and wellbeing: -sensible amounts of 'screen time'.
	Physical Development		• Develop their small motor skills so that they can use a range of tools competently, safely and confidently.
	Expressive Arts and Design		• Explore, use and refine a variety of artistic effects to express their ideas and feelings.
ELG	Personal, Social and Emotional Development	Managing Self	• Be confident to try new activities and show independence, resilience and perseverance in the face of challenge. • Explain the reasons for rules, know right from wrong and try to behave accordingly.
	Expressive Arts and Design	Creating with Materials	• Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function.

7. **KS1 and KS2**

At KS1 children are taught to:

- **understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions.** An algorithm is a precisely defined procedure – a sequence of instructions, or a set of rules, for performing a specific task (e.g. instructions for changing a wheel or making a sandwich). While all correct algorithms should produce the right answer, some algorithms are more efficient than others. Computer scientists are interested in finding better algorithms, partly out of intellectual curiosity, and partly because improvements in algorithms can result in massive savings in terms of both cost and time.
- **create and debug simple programs**.
- **use logical reasoning to predict the behaviour of simple programs.** Computers are deterministic machines. We can predict exactly how they'll behave through repeated experience or by developing an internal model of how a piece of software works. Stepping through the program can give a clear sense of what it does, and how it does it, giving a feel for the algorithm that's been implemented. In the classroom, getting one pupil to role-play a floor turtle or screen sprite while another steps through the program can give a far more immediate sense of what's going on. When working with a computer, encourage pupils to make a prediction about what the program will do before they press return or click the button, and to explain their prediction logically; this is part of computer science. Logical reasoning also implies that pupils are following a set of rules when making predictions. Pupils who step outside the boundaries of these rules are not using logical reasoning. A pupil who expects a beebot to jump doesn't understand the constraints of its programming language or hardware.
- **use technology purposefully to create, organise, store, manipulate and retrieve digital content.** Creating digital content has many practical applications. These include commonplace tasks such as word-processing, creating pictures using paint packages, working with digital photographs and

video (including animations), writing computer programs, and creating online content such as blog posts, forum contributions, wiki entries and social network updates. This creative work is digitised (i.e. converted to numbers) once it's on the computer. The sheer quantity of digital information makes the skill of organising digital content more important than ever. In more practical terms, we might think of how to bring together different digital media, how to order a series of paragraphs, how to organise the files in our documents directory, or how to tag photos and posts online. Storing digital content is perhaps something we take for granted. Knowing where a file is saved in the directory structure is important. It is vital to be able to distinguish between the hard disk (or solid-state storage) inside the computer itself, the school's network server, USB disks or memory cards, and online storage via the internet. Manipulating digital content is likely to involve using one or more application programs, such as word-processors, presentation software, or image-, audio- or video-editing packages. The pupil makes changes to the digital content, which might include combining content from multiple sources. The skill here is not just using the software tools, but also knowing how best to change the content for the audience and purpose, and to take into account principles of good design. Retrieving digital content could be seen as the reverse of storing: the skills of opening and saving documents are similar. Retrieving content requires you to know what you called the file, what file type it is, and where you stored it.

- **recognise common uses of information technology beyond school.** There are many opportunities for pupils to consider the applications of algorithms, programs and systems.
- **use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies**. This statement covers the key principles of pupils' e-safety. Pupils should be aware of the main risks associated with the internet, and recognise that they should not share certain types of personal information online. Pupils must have a clear understanding of what to do if they have concerns about inappropriate online behaviour (such as unwelcome contact or cyberbullying). Telling a teacher or parent should normally be the first response, but pupils should also know that they can talk directly and confidentially to ChildLine about such matters.

At KS2 children are taught to:

- **design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts.** The focus on algorithms at KS1 leads pupils into the design stage of programming at KS2. Algorithms are the necessary start of the process of creating working code, and identifying the steps needed to solve any problem is essential. Splitting problems into smaller parts is part of computational thinking. For example, designing a game in Scratch will involve thinking about algorithms, programming, drawing sprites and backgrounds, making animations, and even composing music or recording sound effects.
- **use sequence, selection, and repetition in programs; work with variables and various forms of input and output.** Sequence in this context is the step-by-step nature of computer programs, mirroring the sequence of steps the algorithm would list. Selection refers to instructions such as if … then … otherwise decisions in which the operation (what the program does) depends on whether or not certain conditions are met. For example, a quiz provides different feedback if the player answers the question correctly or incorrectly. It is helpful to refer pupils to selections (choices) they make in everyday life; for example, if it rains in the morning, then I will wear my anorak to school, otherwise I won't. Repetition is a programming structure such as a repeat … until loop in which the computer runs part of the program a certain number of times or until a particular condition is met. Variables are used to keep track of the things that can change while a program is running. They are a bit like x or y in algebra, in that the values may not initially be known.

- **use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs**. KS2 pupils should be able to explain the thinking behind their algorithms, talking through the steps and explaining why they've solved a problem the way they have. They also need to be able to look at a simple programming project and explain what's going on. This is made easier with languages like Scratch, Kodu and Logo, which feature an on-screen sprite or turtle. The immediate feedback helps pupils to understand and debug their programs. Pupils might also be expected to look at someone else's algorithm and explain how it does what it does.
- **understand computer networks including the internet; how they can provide multiple services, such as the world wide web; and the opportunities they offer for communication and collaboration.** Computer networks, including the internet, are made up of computers connected together. The computers include fast, dedicated machines that pass on data that's not intended for them (called 'routers', 'gateways', 'hubs' or 'switches', depending on particular roles), and 'servers' (always-on machines looking after emails, web pages and files that other computers might ask for from time to time). The connections between the computers in a network may consist of radio or satellite signals, copper wires or fibre-optic cables.
- **use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content.** Using search technologies involves aspects of computer science, information technology and digital literacy. Effective use of search engines gets the results you want. It relies on specifying the right keyword, skimming and scanning the results to see which seems most relevant, and distinguishing between the main results and adverts presented as sponsored results. It may also involve using other features of the search engine, including searching for phrases rather than keywords, or limiting searches to a particular time frame, language, reading level or website.
- **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.** This is something of a catch-all requirement, bringing together various aspects of the computing curriculum. Pupils might typically be expected to demonstrate progression by:
    - using software under the control of the teacher
    - then, using software with increasing independence
    - then, combining software (e.g. importing an edited image or video into a presentation or web page)
    - then, selecting software themselves (perhaps from the full range of applications installed on computers, smartphones and tablets at home or at school, or available to them via the web).
- **use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact**. Safe and responsible use of technology at key stage 2 builds on skills learned in key stage 1. As well as requiring pupils to keep themselves safe and to treat others with respect, the programme of study at key stage 2 introduces an emphasis on responsible use of technology. Pupils need to consider how their online actions impact other people. They need to be aware of their legal and ethical responsibilities, such as showing respect for intellectual property rights (e.g. musical, literary and artistic works), keeping passwords and personal data secure, and observing the terms and conditions for web services they use (such as the 13+ age restriction on most websites, including Facebook, resulting from COPPA10 legislation). Pupils should also develop some awareness of their digital footprint: the data automatically generated when they use the internet and other communication services, and how this is, or could be, used. Pupils should be aware of, and abide by, the school's acceptable use policy, as well as the requirements of any other services they use.

Encourage pupils to think twice, and to check terms and conditions, before signing up for internet-based services.

8. **Equal Opportunities**

Whole school policy on equal opportunities will be adhered to in the computing curriculum. The curriculum is available to every child and all children take part in the activities, making a positive contribution to the life of the school.

9. **Inclusion**

Children with special educational needs or disabilities will be differentiated for and supported appropriately, to ensure development of skills and equal access to the Computing curriculum. All children will be supported through differentiation, adaptation or adult support, to enable equal access to learning in Computing.

10. **Role of the Subject Leader**

The Computing lead will:

- Monitor the teaching and learning of computing across the school, to support and guide the practice of teachers, ensuring a high quality of teaching and learning.
- Monitor and evaluate the effectiveness of the teaching and learning of computing, and liaise and consult with external agencies where appropriate.
- Support and facilitate opportunities that support the continued professional development of teachers in the teaching and learning of computing.
- Oversee and maintain resources to support the teaching and learning of computing.

11. **Parents**

Parents and carers with specialist computing skills are warmly encouraged to approach the school with support and ideas for clubs, workshops or a discussion about how to support and enrich computing at Stower Provost. The school will actively seek to engage and collaborate with parents and carers with specialist skills for this purpose