Computing Toolkit

Our Vision & Rationale

At St Mark's, we understand the need for a strong, high-quality computing education which provides children with a set of essential skills required in today's technological world. Our aim is to present our pupils with a strong and exciting computing curriculum that ensures continuity and progression, and allows our children to become confident and independent technology users. Our goal is to develop a range of skills which can be enhanced and utilised in different curriculum subjects. As they progress through their computing learning, pupils will grow to understand how to use technology purposefully and appropriately. Our children will be able to demonstrate their learning behaviours of resilience and creativity as they become planners and complex problem solvers during a range of programming tasks. Throughout their time at St Mark's, our pupils will be encouraged to use their knowledge from a range of different subjects to develop as critical computer thinkers. Central to our computing curriculum is that every child is taught how to use the Internet and all technology in a safe and respectful way and how to act appropriately online. Our pupils will have a strong awareness of the precautions they should take to stay safe online and what to do if issues occur. With the growing concerns over technology and mental health, we will discuss the positive and negative impacts of devices in the modern world and how to ensure they do not take over our lives!

An effective computer scientist…

E-SAFETY	IMPACT	BASIC SKILLS	CREATING	PROGRAMMING	NETWORKING	MODELLING
…understands what it means to keep themselves and others safe online.	…understands what technology is, the forms in which it exists, and how it affects our lives – both good and bad.	…has secure skills in computing, including: mouse and typing skills; manipulating files and folders; logging in; networking & printing.	…is able to create, publish and analyse information in a variety of formats using a variety of software tools, including media.	…understands what algorithms and software programs are, how they work, and how to design, debug and manipulate them.	…understands computer networks including the internet, and the opportunities they offer for communication and collaboration.	…understands how computers help us to represent real life situations.

These learning behaviours are particularly helpful in becoming an effective computer scientist:

Purpose of study

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.

Supporting SEND

For students with SEND, technology provides great opportunities for accessing learning, for enabling communication and preparing them for their future lives and careers.

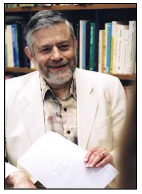
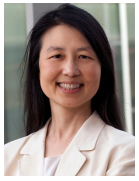
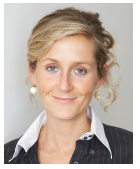
- Computational thinking skills are at the heart of the Computing curriculum, and teaching these provides pupils with problem-solving skills that can be applied across the curriculum. For example, being able to decompose and debug a problem can be applied in maths as well as computing; sequencing steps in an algorithm can be applied to essential life skills.
- Computing as a whole provides creative, accessible ways of reinforcing learning across the curriculum, for example in literacy and numeracy, or to support priorities such as social skills, motor skills and communication.
- Technology can help pupils with special educational needs and disabilities to access learning, information and leisure activities: learning more about how this technology works through Computing can ensure pupils use it safely and responsibly
- Devices with outputs that include sound, movement and light ensure learners with visual or auditory impairment are included.

In Computing, the pupils you might expect to need support may not need it. Likewise, those you would class as working at greater depth in other curriculum areas might need support. Often the degree to which children will need support is down to the level of access to and experience of exploring technology at home.
Pupils are often quite good at choosing an appropriate level for them. By presenting them with different options, they may self-select the right level, or they may select to challenge themselves.
Some children may need the following adaptations to enable them to fully access Computing lessons:

- alternative methods of recording being offered, eg voice recognition software for word processing, Talking Tins
- use of assistive technology:
    - ”Join me” software used for increasing children’s concentration or for supporting children with visual impairment.
    - spell checking software.
    - use of a mouse rather than the touchpad.
- opportunities to work in different formats to their peers. Some pupils with SEND may get more satisfaction from individual and more practical work - using cameras, sequencing images of different steps in an algorithm
- provision of unplugged activities (computing without a computer) makes it much easier to explore the concepts involved and to ask questions. This can be really beneficial to learners with communication or learning difficulties who find abstract concepts difficult and require a multimodal approach. Unplugged activities can include a range of sensory approaches, from physical movement to music, and from manipulating objects to drawing pictures. Unplugged activities enable the use of familiar contexts to teach new concepts and knowledge. This approach helps to reduce cognitive load and has the additional benefit of being able to set the context in accordance with learner’s specific interests; which may motivate learning.
- provision of a range of teaching materials to enable pupils to access learning. E.g. colourful support materials; imaginative unplugged activities and interactive online activities to support pupil’s learning and enable them to achieve.

Diversity

We know it is imperative to promote to our children that anyone can be great at Computer Science whatever their gender, upbringing, ethnicity, sexuality or age. We want to celebrate this diversity at St Mark’s by recognising that we are all unique and can bring different qualities to the world of Computing. Within our Computing curriculum, we want to ensure that children receive a broad and balanced representation of Computer Scientists in the real world. We aim to promote this knowledge of diversity by introducing children to a new Computer Scientist each half term as we begin a new Computing unit. We hope these important figures will inspire our learners to believe they can be the next Computer Scientists of the future if they want to be.

Year (rotation)	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Sep 2022 - Aug 2023	**Juliana Rotich**  Kenyan information technology professional	**Leonard M. Adleman**  American Computer Scientist	**Rajeev Motwani**  Indian American professor of Computer Science	**Susan Wojcicki**  Polish-American business executive who is the CEO of YouTube	**Timothy J. Berners-Lee**  English computer scientist best known as the inventor of the World Wide Web	**Shwetal Shah**  Head of Partnerships at Erase All Kittens, a video game that teaches coding and perception of coding and real world skills to 8-13 year old girls
Sept 2023 - Aug 2024	**John Henry Thompson**  Inventor of the Lingo programming language used in Adobe Director and a former Chief Scientist at Macromedia	**Alan Turing**  An English mathematician, computer scientist, logician, cryptanalyst, philosopher, and theoretical biologist.	**Mary Lou Jepsen**  A technical executive and inventor in the fields of display, imaging, and computer hardware	**Christine Farion**  Works in creative fields and builds physical systems using circuits & software	**Manuel Blum**  Venezuelan-American computer scientist who received the Turing Award in 1995 "In recognition of his contributions to the foundations of computational complexity theory	**Dorcas Muthoni**  Kenyan entrepreneur, computer scientist
Sept 2024 - Aug 2025	**Andrew Yao**  Chinese computer scientist and computational theorist	**Anne-Marie Imafidon**  British computing, mathematics and language child prodigy	**Jeannette Wing**  Jeannette Marie Wing is Avanessians Director of the Data Science Institute at Columbia University, where she is also a professor of computer science	**Abdigani Diriye**  Somali computer scientist and research scientist at IBM Research	**Segun Fatumo**  Computational geneticist	**Martha Lane Fox**  British businesswoman, philanthropist, and public service digital projects

Natterhub Coverage of the Computing Curriculum (Highlighted)	
KS1	**Pupils should be taught:** understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions create and debug simple programs use logical reasoning to predict the behaviour of simple programs use technology purposefully to create, organise, store, manipulate and retrieve digital content recognise common uses of information technology beyond school 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.
KS2	**Pupils should be taught:** design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts use sequence, selection, and repetition in programs; work with variables and various forms of input and output use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs 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 use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content 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 use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.
More information found here: https://assets.natterhub.com/upload/resources/downloadables/52/dfe-natterhub-curriculum-tracker-16195361743537.pdf	

EYFS

Computing in the EYFS Curriculum

Although the technology strand has been removed from the EYFS curriculum, there are lots of other assessment opportunities that arise from delivering a well-planned Computing scheme. EYFS Computing lessons are largely cross-curricular with strong links to communication and language, mathematics, physical development and the characteristics of effective learning in particular. The computing curriculum for EYFS is centred around play based, unplugged activities that focus on building children's listening skills, curiosity, creativity and problem solving.

Technology in the Early Years can mean:

- taking a photograph with a camera or tablet
- searching for information on the internet
- playing games on the interactive whiteboard
- exploring an old typewriter or other mechanical toys
- using a Beebot
- watching a video clip
- listening to music

Allowing children the opportunity to explore technology in this child-led way, means that not only will they develop a familiarity with equipment and vocabulary but they will have a strong start in Key Stage 1 Computing and all that it demands.
The plans for Early Years include five units, made up of five lessons each. From exploring hardware to following and giving instructions - it is a precursor to coding, programming and more complex computing found within the Year 1 computing coverage.

Children in the Early Years learn best through play and practical application of skills. The EYFS computing scheme has been designed to align with Early Years pedagogy to ensure that not only are children accessing relevant areas of the curriculum but that they remain highly involved and engaged while doing so. The lessons in each unit involve a blend of teacher-led activities, enhanced provision provocations, active games and independent tasks.

There is flexibility in the timetabling of the sessions. You could choose to start with Unit 1 at the beginning of the year and teach one lesson per week, circling back around to the start when you have completed all 5 units or a lesson could be taught each fortnight.

https://www.kapowprimary.com/wp-content/uploads/2021/06/Computing-EYFS-overview-slides-23-07-21.pdf