

Computing Knowledge and Skills Progression

Computing Curriculum Statement of Intent

At TPA, we want pupils to be masters of technology and not slaves to it. Technology is everywhere and will play a pivotal part in students' lives. Therefore, we want to model and educate our pupils on how to use technology positively, responsibly and safely. We want our pupils to be creators not consumers and our broad curriculum encompassing computer science, information technology and digital literacy reflects this. We want our pupils to understand that there is always a choice with using technology and as a school we utilise technology (especially social media) to model positive use. We recognise that the best prevention for a lot of issues we currently see with technology/social media is through education. Building our knowledge in this subject will allow pupils to effectively demonstrate their learning through creative use of technology.

We recognise that technology can allow pupils to share their learning in creative ways. We also understand the accessibility opportunities technology can provide for our pupils. Our knowledge rich curriculum has to be balanced with the opportunity for pupils to apply their knowledge creatively which will in turn help our pupils become skilful computer scientists.

We encourage staff to try and embed computing across the whole curriculum to make learning creative and accessible. We want our pupils to be fluent with a range of tools to best express their understanding and hope by Upper Key Stage 2, children have the independence and confidence to choose the best tool to fulfil the task and challenge set by teachers.

Implementation

Our whole curriculum is shaped by our school vision which aims to enable all children, regardless of background, ability, additional needs, to flourish to become the very best version of themselves they can possibly be – we are ambitious for all. We teach the National Curriculum using the scheme 'Teach Computing', supported by a clear skills and knowledge progression. This ensures that skills and knowledge are built on year by year and sequenced appropriately to maximise learning for all children.

To ensure a broad range of skills and understanding, Computing is taught across three main strands: digital literacy, computer science and information technology. As part of information technology, children learn to use and express themselves and develop their ideas through ICT for example writing and presenting as well as exploring art and design using multimedia. Within digital literacy, children develop practical skills in the safe use of ICT and the ability to apply these skills to solving relevant, worthwhile problems for example understanding safe use of internet, networks and email. In computer science we teach children to understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation. Also to analyse problems to computational terms, and have repeated practical experience of writing computer programs in order to solve such problems. We also teach a progression of Computing vocabulary to support children in their understanding.

At TPA, we give children access to a wide range of good quality resources and provide cross curricular opportunities for children to apply their Computing knowledge and skills. Online safety is taught within each Computing lesson as a short starter activity as well as being taught as a unit each year. Online safety procedures are communicated with all staff and parents.

In EYFS, computing learning begins in the Early Years at TPA. Though not explicitly mentioned in the EYFS curriculum, we ensure that all our learners develop a solid foundation by building on their curiosity. For example, classrooms could contain a role play area with a range of technology, both functioning and model / broken devices, or a variety of electronic toys, such as remote controlled cars, walkie-talkies and interactive pets, as part of continuous provision. Further technology could be included in conjunction with other activities, such as digital cameras for pupils to photograph their own learning, although children should ideally be given the opportunity to select and use technology for a certain purpose, rather than simply being given a device. The pedagogical approaches used in this age group should also be carefully considered, which includes the need to tinker, or play, with a device, in order to discover how it functions. Across the curriculum, in both the inside and outside areas, children are also encouraged to utilise simple programming tools such as Bee Bots. This allows them to build on their communication and language. In Expressive Arts, children could use programmes such as 2Paint a Picture.

Computing National Curriculum

Key Stage One	Key Stage Two
Pupils should be 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 • 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.	Pupils should be 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 • 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.
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Computing Terms

1. Substantive knowledge

Substantive knowledge in computing is understanding how to use technology, how to be safe and knowing how to program. This is developed through deliberate practice and by children applying their knowledge of how to be computational thinkers.

“Computational thinking is an important life skill, which all pupils now need to develop. It is central to both living in and understanding our digitally enriched world. It is a cognitive process involving logical reasoning by which problems are solved across the whole curriculum and through life in general.” (Computing at School, 2015)

In order to develop as computational thinkers, children engage with computational concepts and approaches:

Concepts	Approaches
- Logic: predicting and analysing - Algorithms: making steps and rules - Decomposition: breaking down into parts - Patterns: spotting and using similarities - Abstraction: removing unnecessary detail - Evaluation: making judgements	- Tinkering: experimenting and playing - Creating: designing and making - Debugging: fixing and finding errors - Persevering: keeping going - Collaborating: working together

Disciplinary knowledge

Disciplinary knowledge in computing is the use and interpretation of substantive knowledge in order to develop original digital content and programs.

Impact

The implementation of this curriculum ensures that when children leave TPA, they are competent and safe users of ICT with an understanding of how technology works. They will have developed skills to express themselves and be creative in using digital media and be equipped to apply their skills in Computing to different challenges going forward.

Yearly Overview

We use

Year group	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
EYFS	Across the year: Know that digital technology is used for communication. E-safety introduction, inputting instructions into floor robots; use age appropriate software					
Year 1		Computer systems and networks Recognising technology in school and using it responsibly.	Programming A – Bee Bots Writing short algorithms and programs for floor robots, and predicting program outcomes. B	Data and Information - Grouping data Exploring object labels, then using them to sort and group objects by properties.	Creating Media Digital writing Using a computer to create and format text, before comparing to writing non-digitally.	Programming B - Programming animations (Scratch Jr.) Designing and programming the movement of a character on screen.
Year 2	Computer Systems and Networks - Information technology around us Identifying IT and how its	Creating Media - Digital photography Capturing and changing digital	Programming A - Robot algorithms (Bee Bots) Creating and debugging	Data and Information Pictograms Collecting data in tally charts and using attributes to organise and present data on a computer.	Creating Media Digital music Using a computer as a tool to explore rhythms and melodies, before creating a musical composition.	Programming B - Programming quizzes Designing algorithms and programs that use events to trigger sequences

	responsible use improves our world in school and beyond.	photographs for different purposes.	programs, and using logical reasoning to make predictions.			of code to make an interactive quiz.
Year 3	Connecting computers Identifying that digital devices have inputs, processes, and outputs, and how devices can be connected to make networks.	Stop-frame animation Capturing and editing digital still images to produce a stop frame animation that tells a story.	Sequencing sounds Creating sequences in a block-based programming language to make music.	Branching databases Building and using branching databases to group objects using yes/no questions.	Desktop publishing Creating documents and modifying text, images and page layouts for a specific purpose.	Events and actions in programs Writing algorithms and programs that use a range of events to trigger sequences of actions.
Year 4	Computer Systems and Networks - The internet Recognising the internet as a network of networks including the WWW, and why we should evaluate online content.	Creating media - making a podcast about Spain	Programming A - Repetition in shapes Using a text-based programming language to explore count-controlled loops when drawing shapes	Data and Information Data logging Recognising how and why data is collected over time, before using data loggers to carry out an investigation.	Creating Media Photo editing Manipulating digital images, and reflecting on the impact of changes and whether the required purpose is fulfilled.	Programming B - Repetition in games (Scratch) Using a block-based programming language to explore count-controlled and infinite loops when creating a game

Year 5	Creating Media - video production Creating Media - Video production Planning, capturing, and editing video to produce a short film. Touch Typing Refresher	Computing systems and networks (Mars Rover) Computer Systems and Networks - Systems and searching Recognising IT systems in the world and how some can enable searching on the internet.	Databases Data and Information Flat-file databases Using a database to order data and create charts to answer questions	Programming - scratch quizzes (Ancient Greeks quiz?) Programming B - Selection in quizzes (Scratch) Exploring selection in programming to design and code an interactive quiz.	Programming - Microbits https://microbit.org/teach/lessons/volcano-animations-unit-of-work/	Vector Graphics using Google Drawings Creating Media Introduction to vector graphics Creating images in a drawing program by using layers and groups of objects
Year 6	Computer Systems and Networks - Communication and collaboration Exploring how data is transferred by working collaboratively online.	Creating Media - Webpage creation Designing and creating webpages, giving consideration to copyright, aesthetics, and navigation.	Programming A - Variables in games (Scratch) Exploring variables when designing and coding a game.	Data and Information Introduction to spreadsheets Answering questions by using spreadsheets to organise and calculate data.	Programming - Microbits	Y6 - Y7 transition with Microbits



Impact

Providing our pupils with high quality computing is something we pride ourselves with here at Twickenham Primary Academy. As a result, we have seen high levels of engagement from the children and a large progression in their computing skills. Many children achieve the expected standard for computing.