

Computing Policy

July 2022

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1. Curriculum Statement

Intent

Our aim is to give children a thorough and ambitious education in computing, equipping them to use technology, computational thinking and creativity to understand and change the world. It is now more important than ever that children understand how to use technology positively, responsibly and safely, and that they see good models of this.

By the time they leave William Patten, children will have gained key knowledge and skills in the three main strands of the National Curriculum for Computing (2014). These strands are: computer science (programming and understanding how digital systems work), information technology (using computer systems to create, store, retrieve and send information) and digital literacy (evaluating digital content and using technology safely and respectfully).

Our knowledge-engaged curriculum enables children to understand how computers and computer systems (such as the internet) work, and how they are designed and programmed. It ensures they know what to do if they have concerns about anything they encounter online, and how to be safe, responsible and respectful when using the internet. Equally, our offer provides many opportunities for learners to apply their evolving knowledge imaginatively, becoming fluent and creative in their mastery of computing. The depth and breadth of our coverage aims to provide all our children with a solid grounding for future learning and the ability to become active digital citizens in the modern world.

Implementation

At William Patten, computing is taught using a blocked-curriculum approach, in which lessons are taught consecutively during a two-week block, rather than once per week over each term. Teachers use specified units from the updated 'Switched On: Computing' scheme, published by Rising Stars, as a starting point for the planning of their computing lessons. The key knowledge and skills that must be taught within each unit have been identified and carefully mapped to support the progression of children's learning across the primary phases, building towards mastery of the end of key stage objectives from the National Curriculum. Freedom for teachers to develop and adapt computing units within the framework of the progression map leads to rich links with engaging contexts in other subjects and topics, while still ensuring systematic coverage of objectives. An overview of each unit's key vocabulary, key knowledge and linked prior knowledge is shared with families and children before each computing block begins, through our 'Topic Vocabulary' mats. After completing a unit, learners complete a brief key knowledge quiz to assess their retention and understanding of core facts and concepts. They also self-assess their confidence in the skills practised throughout the project.

The implementation of our new progression framework in computing ensures a balanced coverage of the three computing strands (computer science, information technology and digital literacy). The children work on all three strands each year. As they progress through the school, children build on their prior learning within each strand, covering new or deeper knowledge and developing their technical skills. The relevant, context-embedded computing experiences through which this knowledge-engaged curriculum is taught will benefit learners in secondary school, further education and future workplaces. From research methods, use of presentation and creative tools and computational and critical thinking, computing at William Patten gives children the building blocks that enable them to pursue a wide range of interests and vocations in the next stage of their lives.

Impact

Our approach to the curriculum provides fun, engaging and meaningful learning for all pupils, in which the children understand not only the content that is taught but the opportunities offered to them by their computing education, enabling them to become creators and change-makers in our digital world. The impact of our curriculum and the quality of children's learning is evident in their work, which is shared, published and celebrated on Seesaw (an online platform) and in their topic books - using photographs and QR codes to showcase digital work. Fortnightly monitoring of these outcomes, alongside key knowledge quiz results, and interviews with teachers and learners, allows the subject lead to ensure the knowledge-engaged curriculum taught is being learned and retained by all pupils. All this information also feeds into teachers' future planning and enables assessment of pupil's knowledge and skills. Through cross-curricular uses of computing in other subjects, teachers are able to revisit misconceptions and knowledge gaps in computing in tandem with other curriculum areas. This supports varied paces of learning and ensures all pupils make good progress.

2. Teaching and Learning

As outlined in the implementation of the curriculum, the computing curriculum is mapped to ensure alignment with the National Curriculum and progression across the year groups and phase groups. Key knowledge and skills build towards mastery of specific end point objectives at the end of each key stage (in Y2 and Y6) with the knowledge and skills taught in the EYFS preparing pupils to work towards the National Curriculum's programme of study in Year 1.

We use a range of hardware to support the teaching and learning of computing, including our computing suite, microphone and headphone sets for recording, wall-mounted Promethean boards in every class, 30 laptops/chromebooks and two class sets of ipads (to be refreshed in 2021). We also have programmable robots (Beebots) for EYFS and KS1 and two sets of Micro:Bits for KS2. This ensures that all year groups have the opportunity to use a range of devices and programs for many purposes across the wider curriculum, as well as in discrete computing lessons. Employing cross-curricular links motivates pupils and supports them to make connections and remember the steps they have been taught.

At the start of each computing unit, teachers seek to link new learning to previous learning in line with the whole school knowledge and skills progression map, by reviewing what the children already know (part of the 'KWL' approach). Teachers also identify what children would like to learn, to enable units to be adapted to take account of children's interests, as well as to the needs of the class. Prior learning is identified on topic vocabulary (TV) mats and on topic working walls, which are used alongside the display boards in the suite to support and celebrate learning, and to display key knowledge and vocabulary. As well as the prior learning, the key knowledge and vocabulary to be covered in each unit is sent home to learners and their families on the TV mat.

In each lesson, children are guided towards accomplishing the learning intention through the use of success criteria. The LI and success criteria are shared at the beginning of the lesson and reviewed by children at the end. They support teachers and students to identify individual target areas. Lessons are planned to enable children to acquire key knowledge alongside the development of key skills, and outcomes of work will reflect this. The knowledge and skills that children have been taught in a unit is reviewed by the children and checked by the teacher, allowing opportunities for timely intervention where necessary.

Teachers' own use of computing in lessons is also an essential part of preparing engaging, fast moving, motivating lessons for pupils. The computing co-ordinator will keep teachers up

to date on the latest digital teaching tools; individual teachers then need to implement these tools into their lessons wherever beneficial.

3. Assessment

Formative Assessment

Self-assessment

As well as opportunities to self-assess their mastery of key knowledge and skills at the end of each lesson and each unit of work, children are taught to debug their own programs, use logical reasoning to explain simple algorithms (including their own), and detect and correct errors in both algorithms and programs. In doing this, they are continually assessing their own work, and learning how to improve. There are also many opportunities to evaluate the digital artefacts they create and develop.

Peer-assessment

The ideas of self-assessment suggested above translate naturally into peer assessment, with pupils working with a partner to review, and help correct, algorithms and programs, or provide critical, constructive feedback on digital content.

Progressive questioning

Pupils' knowledge of the concepts covered by the programme of study may not be immediately apparent in the work they produce. The use of progressive questioning, which implements ideas from Bloom's taxonomy, allows teachers to assess and develop a learner's grasp of concepts.

Discussion with peers

Encouraging pupils to discuss open questions with their peers can be effective in allowing them to focus on what they've learned, rather than only on what they've done. Discussion and debate on our online platforms, such as Seesaw, is also a powerful way to illustrate the opportunities offered by computer networks for communication and collaboration.

Target setting

Project management skills developed through computing, such as planning, organising, motivating others and allocating resources, are of great importance in real-world projects, and they can be widely applied in education.

Seesaw

Children's computing work should be evidenced on Seesaw, our online journal, with an overview of learning and outcomes to be showcased in topic books.

Summative Assessment

The key knowledge and skills stated on the computing progression map are colour coded to show how they relate to the objectives from the National Curriculum programme of study. Children's attainment of these objectives are assessed by the teacher based on the learner's

outcomes, results of their key knowledge quiz and self-assessment of skills as part of the KWL grid. This informs focused consolidation where necessary. The quality of teaching and learning is also assessed at the end of a unit, as part of the fortnightly monitoring cycle. As well as the above assessments, teacher and pupil voice interviews are undertaken to provide a clearer picture of the impact of teaching and learning. The aim of this monitoring is to ensure that tasks have been adapted to meet the needs of different learners, and that the pre-identified key knowledge and skills have been taught and acquired/developed.

4. Planning and Resources

Planning

Rising Stars: Switched On Computing



The school uses the updated Rising Stars: Switched On Computing scheme as a starting point to deliver the national curriculum programme of study. Our implementation of this scheme supports clear progression of skills from Years 1 to 6, with EYFS basing their planning on provision on reaching the starting points for Year 1, preparing the children for the work that will be covered in the following years. The updated computing scheme supports teachers of all levels of experience as it provides software overviews, CPD videos and detailed planning with the basis for lesson slides. Throughout the scheme, online safety and digital literacy is embedded, even within the other strands, to ensure the safe and responsible use of technology is at the centre of all teaching and learning. A range of new and free software has been installed to enable delivery of our curriculum, and software alternatives are indicated on planning. Planning documents and lesson resources have been saved and organised by year group and unit on the Shared Drive.

Resources

Computing Suite

There are 18 computers, each having access to a range of programmes that can meet the needs of the new programme of study. We also have 30 laptops/chromebooks to support independent learning in the computing suite, as well as allowing computing work in the classroom environment.

iPads

Each teacher has an iPad for assessment purposes. We have two class sets of iPads for use within the classroom to support the programme of study.

Classroom Computers

There is at least one desktop computer in each classroom. These machines are networked and have access to the shared drive for planning and preparation.

Printers and Photocopiers

Each floor now has at least one colour photocopier which is networked to each computer.

Interactive Whiteboards

Each classroom has an interactive board linked to the desktop computer.

Other Resources to support the curriculum

- Micro:Bits
- Beebots
- Headphones
- Microphones
- Webcams with microphones for classroom desktop computers
- Google Classroom

5. Organisation

Children study computing in blocks, and the content of each block is outlined in the school's Computing Knowledge and Skills Progression Map. This approach enables a project-based approach to computing and supports a greater depth of understanding throughout the focussed teaching block.

6. EYFS

The computing curriculum is introduced in the EYFS, as a foundation for work in KS1. Children are given the opportunity to explore coding on Beebots and also through coding projects for pre-readers on the iPads (code.org). Children in Nursery and Reception are also supported to create drawings, recordings and other digital content on iPads and on the interactive whiteboard. Digital literacy and online safety is developed through age-appropriate stories such as Digiduck, and is reinforced through participation in whole-school events such as Safer Internet Day.

6. KS1 and KS2

At William Patten, children in both key stages are taught about the benefits of the knowledge and skills they are learning, as well as their application in real life contexts and professions.

Key Stage 1 - Subject Knowledge

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.

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 roamer 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 possibilities. 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's 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. As well as the emphasis on this aspect in lessons, the school also celebrates the annual national 'Safer Internet Day'. This includes a KS1 assembly about e-safety, led by

the coordinator and communications to parents in line with national guidance on safer internet use at home.

Key Stage 2 - Subject Knowledge

Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them in to smaller parts.

The focus on algorithms at key stage 1 leads pupils into the design stage of programming at key stage 2. 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.

Key stage 2 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 features⁷ 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.

As well as the emphasis on this aspect in lessons, the school also celebrates the annual national 'Safer Internet Day'. This includes an assembly for each key stage related to the year's e-safety theme, led by the computing coordinator, and resources disseminated for follow up work in class. Alongside this there is communications to parents in line with national guidance on safer internet use at home, either through the Patten Pages or by email.

7. Equal Opportunities

William Patten Primary School will ensure that all children are provided with the same learning opportunities regardless of social class, gender, culture, race, disability or learning difficulties. As a result we hope to enable all children to develop positive attitudes towards others. All pupils have equal access to computing and all staff members follow the equal opportunities policy. Resources for SEN children and children who are working at greater depth are made available to support and challenge appropriately. In 2021, William Patten took part in two studies on 'Gender Balance in Computing' to support attempts to redress the gender imbalance in uptake of computing subjects in KS4 and beyond.

8. Inclusion

The inclusion of all learners is central to our implementation of a knowledge-engaged computing curriculum, and teachers adapt their teaching and learning tasks and activities to ensure an appropriate level of challenge for all groups and individuals. Even prior to scaffolding or adaptations, progress for all groups, particularly in programming and computer science, can be supported by the use of 'low floor high ceiling' tasks, programs and platforms (Grover and Pea, 2013). For example, employing block-based programming on Scratch enables all learners to cross the threshold into creating a working program, while also being powerful and extensive enough for more advanced programmers to progress and thrive (Handbook of Research on Instructional Systems and Educational Technology, 2017).

Computing forms part of the national curriculum to provide a broad and balanced education for all, which can only be achieved by setting suitable learning challenges and responding to each child's different needs. Our topic vocabulary (TV) mats are sent home to families and learners ahead of each computing block. These provide visuals for key vocabulary alongside definitions, prior learning links, key knowledge for the unit linked to the NC PoS and other useful information. Relevant books and online resources are also sign-posted on the TV mats. This approach, as well as using the visuals and information with learners in class, allows us to make key knowledge explicit for all pupils. This is particularly useful in supporting pupils in receipt of the PPG, who may not have had the same access or experiences with technology and computing as their peers. The visual vocabulary, alongside our use of 'Word Aware', seeks to support our learners with SEN (and indeed all our learners) to understand, use and retain the key vocabulary of computing. Children with SEN and those in receipt of the PPG are a particular focus when conducting fortnightly monitoring, to evaluate the inclusivity of the curriculum and ensure these children are making good progress and achieving in line with their peers.

Where appropriate, computers and other digital/assistive technology resources can be used to support children with special educational needs on a one to one basis across the curriculum, and our teachers have received training to enable this. Additionally, as part of our approach to teaching and learning, we will use adapted resources wherever possible, such as visual timetables, different coloured backgrounds, enlarged fonts and screen printouts.

9. Role of the Subject Leader

The computing coordinator is responsible for overseeing the development, implementation and impact of an ambitious and engaging computing curriculum, which enables all students to progress in their mastery of computer science, digital literacy and information technology. The targets and priorities for the development of computing are outlined by the subject leader at the start of each academic year in the School Development Plan. Measures of success are analysed and evaluated by the computing coordinator as part of the fortnightly monitoring cycle. Learner's outcomes on Seesaw and in books, end-of-unit key knowledge quiz results and pupil self-assessments are all examined in order to measure the impact of our curriculum and identify areas for action. Pupil and teacher voice interviews and a review of lesson slides are also undertaken as part of the fortnightly cycle, enabling the subject leader to maintain a clear picture of computing across classes and key stages. This monitoring process allows the coordinator to assess and address staff training needs on a regular basis, guiding the annual development plan process and response to individual needs and requests throughout the year.

Individual teachers should also attempt to continually develop their own skills and knowledge, using the signposted CPD resources and software videos, identifying their own outstanding needs and notifying the coordinator. Teachers will be encouraged to use their information technology skills to produce plans, reports, communications and teaching resources. The co-ordinator will provide on-going staff training to ensure teachers are confident in delivering the new curriculum, in a range of contexts. This will have an emphasis on ensuring teachers can support appropriate progression in knowledge and skills in line with the computing knowledge and skills progression map.

Where necessary, the computing coordinator will work alongside the technician to support staff to overcome technical issues with computing technology at the school, and help to support parents with the digital devices and software that they use with their children for home learning. The coordinator will also liaise and access support from the technician, who visits on a weekly basis, as and when required.

The computing coordinator will oversee and maintain resources to support the computing curriculum. They will maintain links with external agencies to explore opportunities to enrich the computing curriculum by providing access to specialist trips, expertise and resources. They will also ensure high standards across the computing curriculum through effective monitoring, modelling of lessons, and support with planning, as appropriate.

The computing coordinator also runs a Code Club for KS2 pupils.

10. Parents

Parental involvement is highly encouraged, particularly if there is a specialist subject being taught within a class. Code mornings have been held previously and parents can be encouraged to learn code along with their children at home.

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