Progression in Computing

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.

Aspect	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Computational Thinking	Input simple instructions to make technological toys operate, including floor robots and onscreen sprites. Explore how to use different computing hardware. Use age-appropriate software independently.	Children understand that an algorithm is a set of instructions used to solve a problem or achieve an objective. They know that an algorithm written for a computer is called a program. Children can work out what is wrong with a simple algorithm when the steps are out of order, e.g. The Wrong Sandwich in Purple Mash and can write their own simple algorithm, e.g. Colouring in a Bird activity. Children know that an unexpected outcome is due to the code they have created and can make logical attempts to fix the code, e.g. Bubbles activity in 2Code. When looking at a program, children can read code one line at a time and make good attempts to envision the bigger picture of the overall effect of the program. Children can, for example, interpret where the turtle in 2Go challenges will end up at the end of the program.	Children can explain that an algorithm is a set of instructions to complete a task. When designing simple programs, children show an awareness of the need to be precise with their algorithms so that they can be successfully converted into code. Children can create a simple program that achieves a specific purpose. They can also identify and correct some errors, e.g. Debug Challenges: Chimp. Children's program designs display a growing awareness of the need for logical, programmable steps. Children can identify the parts of a program that respond to specific events and initiate specific actions. For example, they can write a cause and effect sentence of what will happen in a program.	Children can turn a simple real-life situation into an algorithm for a program by deconstructing it into manageable parts. Their design shows that they are thinking of the desired task and how this translates into code. Children can identify an error within their program that prevents it following the desired algorithm and then fix it. Children demonstrate the ability to design and code a program that follows a simple sequence. They experiment with timers to achieve repetition effects in their programs. Children are beginning to understand the difference in the effect of using a timer command rather than a repeat command when creating repetition effects. Children understand how variables can be used to store information while a program is executing. Children's designs for their programs show that they are thinking of the structure of a program in logical, achievable steps and absorbing some new knowledge of coding structures. For example, 'if' statements, repetition and variables. They make good attempts to 'step through' more complex code in order to identify errors in algorithms and can correct this. e.g. traffic light algorithm in 2Code. In programs such as Logo, they can 'read' programs with several steps and predict the outcome accurately. Children can list a range of ways that the internet can be used to provide different methods of communication. They can use some of these methods of communication, e.g. being able to open, respond to and attach files to emails using 2Email. They can describe appropriate email conventions when communicating in this way.	When turning a real-life situation into an algorithm, the children's design shows that they are thinking of the required task and how to accomplish this in code using coding structures for selection and repetition. Children make more intuitive attempts to debug their own programs. Children's use of timers to achieve repetition effects are becoming more logical and are integrated into their program designs. They understand 'if statements' for selection and attempt to combine these with other coding structures including variables to achieve the effects that they design in their programs. As well as understanding how variables can be used to store information while a program is executing, they are able to use and manipulate the value of variables. Children can make use of user inputs and outputs such as 'print to screen'. Children's designs for their programs show that they are thinking of the structure of a program in logical, achievable steps and absorbing some new knowledge of coding structures. For example, 'if' statements, repetition and variables. They can trace code and use step- through methods to identify errors in code and make logical attempts to correct this. e.g. traffic light algorithm in 2Code. In programs such as Logo, they can 'read' programs with several steps and predict the outcome accurately. Children recognise the main component parts of hardware which allow computers to join and form a network. Their ability to understand the online safety implications associated with the ways the internet can be used to provide different methods of communication is improving.	Children may attempt to turn more complex real-life situations into algorithms for a program by deconstructing it into manageable parts. Children are able to test and debug their programs as they go and can use logical methods to identify the approximate cause of any bug but may need some support identifying the specific line of code. Children can translate algorithms that include sequence, selection and repetition into code with increasing ease and their own designs show that they are thinking of how to accomplish the set task in code utilising such structures. They are combining sequence, selection and repetition with other coding structures to achieve their algorithm design. When children code, they are beginning to think about their code structure in terms of the ability to debug and interpret the code later, e.g. the use of tabs to organise code and the naming of variables. Children understand the value of computer networks but are also aware of the main dangers. They recognise what personal information is and can explain how this can be kept safe. Children can select the most appropriate form of online communications contingent on audience and digital content.	Children are able to turn a more complex programming task into an algorithm by identifying the important aspects of the task (abstraction) and then decomposing them in a logical way using their knowledge of possible coding structures and applying skills from previous programs. Children test and debug their program as they go and use logical methods to identify the cause of bugs, demonstrating a systematic approach to try to identify a particular line of code causing a problem. Children translate algorithms that include sequence, selection and repetition into code and their own designs show that they are thinking of how to accomplish the set task in code utilising such structures, including nesting structures within each other. Coding displays an improving understanding of variables in coding, outputs such as sound and movement, inputs from the user of the program such as button clicks and the value of functions. Children are able to interpret a program in parts and can make logical attempts to put the separate parts of a complex algorithm together to explain the program as a whole. Children understand and can explain in some depth the difference between the internet and the World Wide Web. Children know what a WAN and LAN are and can describe how they access the internet in school.

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Information Technology	Use age-appropriate software to create images and record sounds and videos.	Children are able to sort, collate, edit and store simple digital content e.g. children can name, save and retrieve their work and follow simple instructions to access online resources, use Purple Mash 2Quiz example (sorting shapes), 2Code design mode (manipulating backgrounds) or using pictogram software such as 2Count.	Children demonstrate an ability to organise data using, for example, a database such as 2Invesitigate and can retrieve specific data for conducting simple searches. Children are able to edit more complex digital data such as music compositions within 2Sequence. Children are confident when creating, naming, saving and retrieving content. Children use a range of media in their digital content including photos, text and sound.	*Children can carry out simple searches to retrieve digital content. They understand that to do this, they are connecting to the internet and using a search engine such as Purple Mash search or internet-wide search engines.* *Children can collect, analyse, evaluate and present data and information using a selection of software, e.g. using a branching database (2Question), using software such as 2Graph. Children can consider what software is most appropriate for a given task. They can create purposeful content to attach to emails, e.g. 2Respond.*	Children understand the function, features and layout of a search engine. They can appraise selected webpages for credibility and information at a basic level Children are able to make improvements to digital solutions based on feedback. Children make informed software choices when presenting information and data. They create linked content using a range of software such as 2Connect and 2Publish+. Children share digital content within their community.	Children search with greater complexity for digital content when using a search engine. They are able to explain in some detail how credible a webpage is and the information it contains. Children are able to make appropriate improvements to digital solutions based on feedback received and can confidently comment on the success of the solution. e.g. creating their own program to meet a design brief using 2Code. They objectively review solutions from others. Children are able to collaboratively create content and solutions using digital features within software such as collaborative mode. They are able to use several ways of sharing digital content.	Children readily apply filters when searching for digital content. They are able to explain in detail how credible a webpage is and the information it contains. They compare a range of digital content sources and are able to rate them in terms of content quality and accuracy. Children use critical thinking skills in everyday use of online communication. Children make clear connections to the audience when designing and creating digital content. The children design and create their own blogs to become a content creator on the internet, e.g. 2Blog. They are able to use criteria to evaluate the quality of digital solutions and are able to identify improvements, making some refinements.
Digital Literacy	Explain that digital technology is used in the home and at school for communication. Ask to use digital devices to create work in a safe and responsible way. Recognise that digital work can be saved, shared and accessed from other devices. Talk about things that people do on digital devices, such as playing games, communicating with others and watching online videos. Talk about and use digital technology with confidence and independence, giving examples of how it is used in the home, at school and beyond. Navigate to find digital content, in digital folders and online, with supervision.	Children understand what is meant by technology and can identify a variety of examples both in and out of school. They can make a distinction between objects that use modern technology and those that do not e.g. a microwave vs. a chair. Children understand the importance of keeping information, such as their usernames and passwords, private and actively demonstrate this in lessons. Children take ownership of their work and save this in their own private space such as their My Work folder on Purple Mash.	Children can effectively retrieve relevant, purposeful digital content using a search engine. They can apply their learning of effective searching beyond the classroom. They can share this knowledge, e.g. 2Publish example template. Children make links between technology they see around them, coding and multimedia work they do in school e.g. animations, interactive code and programs. Children know the implications of inappropriate online searches. Children begin to understand how things are shared electronically such as posting work to the Purple Mash display board. They develop an understanding of using email safely by using 2Respond activities on Purple Mash and know ways of reporting inappropriate behaviours and content to a trusted adult.	*Children demonstrate the importance of having a secure password and not sharing this with anyone else. Furthermore, children can explain the negative implications of failure to keep passwords safe and secure. They understand the importance of staying safe and the importance of their conduct when using familiar communication tools such as 2Email in Purple Mash. They know more than one way to report unacceptable content and contact.*	*Children can explore key concepts relating to online safety using concept mapping such as 2Connect. They can help others to understand the importance of online safety. Children know a range of ways of reporting inappropriate content and contact.*	Children have a secure knowledge of common online safety rules and can apply this by demonstrating the safe and respectful use of a few different technologies and online services. Children implicitly relate appropriate online behaviour to their right to personal privacy and mental wellbeing of themselves and others.	Children demonstrate the safe and respectful use of a range of different technologies and online services. They identify more discreet inappropriate behaviours through developing critical thinking, e.g. 2Respond activities. They recognise the value in preserving their privacy when online for their own and other people's safety.
E-Safety	Describe what they would do if they saw something online that made them sad, scared or worried.	Pupils demonstrate an understanding of the importance of online safety, using their own private usernames and passwords for Purple Mash Most pupils will be able to demonstrate an understanding of the reasons for keeping their password private including talking about the meaning of 'private information' and actively demonstrate this in lessons. Pupils take ownership of their work and will be able to save their work, using a memorable file name, to their own personal space on Purple Mash and understand that this can be retrieved later.	Pupils understand how to use a search bar and know the implications of inappropriate searches. Pupils will be able to explain what a digital footprint is, that it is permanent and their online behaviour influences what it shows. Pupils will be able to give reasons for keeping their password safe that include protecting their personal information. Pupils will be able to express the good and bad sides of digital technology. In lesson 3, they can give examples of positive effects on life as well as negative.	Pupils understand the importance of a secure password and not sharing this with anyone else Furthermore, pupils understand the negative implications of failure to keep passwords safe and secure and can suggest examples of good and poor passwords When using the internet, pupils can appraise the accuracy of the information on a website and make decisions on whether it is a trustworthy source of information. Pupils can understand that it is not acceptable to use the work of others or post images of others without consent.	Pupils can give some examples of things to look out for in an email to ensure that it from a valid source and is not a phishing scam email. Pupils can explain what can be learnt by looking at the padlock details for a website. Pupils can reflect upon positive and negative aspects of a digital footprint and can give examples of the care they would take when sharing online in relation to their and others' digital footprint Pupils can give reasons for taking care when installing apps or software. They know what Malware is and the possible impact of computer viruses and can give recommendations for	Pupils demonstrate an understanding of their responsibility to others as well as to themselves when communicating and sharing content online. Pupils demonstrate a clear understanding of what the SMART rules are and how they should be applied to using technology safely and respectfully Pupils demonstrate that they are developing critical thinking skills in their online experience and know what sorts of inappropriate content should be reported. Pupils can explain why citations must be considered when using the work of others.	Pupils have a good knowledge of the benefits and risks to working collaboratively. Pupils can use search tools and routinely try to verify the validity and reliability of their sources. They look for corroborating sources for information and enter keywords that help them to choose the best results. Children can identify a variety of risks and benefits of technology. Pupils feel confident in having strategies to help them promote a positive online image of themselves in their digital footprint.

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		Explain that their teacher was able to connect with them online to leave a message. Give a simple explanation of the way to word comments online when given an example Contribute their ideas about communicating appropriately and relate online and off-line appropriate behaviour. Open a webpage and use the search bar to find resources. Suggest appropriate words to search with to find the results that they are looking for.	Pupils will be able to express the good and bad sides of digital technology. In lesson 3, they can give examples of positive effects on life as well as negative. Pupils will be able to share their work to a display board. By sharing their work using the display board, pupils begin to understand how things are shared electronically. Pupils will be able to open and respond to simulated emails. Pupils will be able to open and send email responses to simulated emails. Pupils develop an understanding of how to use email safely and responsibly Pupils can relate the creation of a digital footprint to their search history and make contributions to the class discussion about this in relation to online safety. Pupils know that many search engine companies collect and sell information about users.	Pupils recognise the PEGI ratings and can give examples of why content is rated and how this protects them. Pupils can contribute to a class collaborative file about the effects of inappropriate content with useful suggestions. Pupils can express the need to tell a trusted adult if they are upset by anything online. Pupils can use suitable keywords when trying to verify sources. Pupils are able to appraise the accuracy of information shared on a website and a provide suitable evidence to support their decisions on whether it is trustworthy or not. Pupils understand the importance of staying safe when using email. Pupils suggest why they need to seek permission before sharing photos.	how best to ensure that they only install valid software. Pupils can give reasons for limiting screen time that include the effect on physical and mental health. Pupils can explain how plagiarism is stealing, they are beginning to be able to identify the aspects of sharing that would be classed as plagiarism Pupils are able to include actions for reporting cyberbullying or inappropriate content. Pupils can identify key messages that should be shared with other pupils and parents about online safety, including identification of reliable content from websites found via common search engines Pupils can analyse the contents of a web page for obvious clues about the credibility of the information.	Pupils' contributions demonstrate a growing awareness of the context of communication and an ability to view the communication from the intended audience's point-of- view. Pupils will be able demonstrate that they understand what is meant by reliable and can build on their ability to identify reliable content.	Pupils can identify location sharing as a risk to online and could relate this to work done on protecting their identifying private information. Pupils were able to identify the padlock and https as aids to the online safety and could explain what these means. Pupils have a clear understanding of terms such as Computer virus, Location sharing, phishing scams, spam email, Malware and Identity theft. Pupils make sensible contributions to the question of what risks there are when installing an App and the possible risks hidden in the small print. Pupils understand the impact of a positive and negative digital footprint and how to take control of their own online virtual image. Pupils can balance the positive impact of technology with the reasons for limiting screen time that include the effect on physical and mental health. Pupils are able to reflect on their own screen time and collective class screen time and begin to make informed decisions about when to limit their own screen time Pupils take care to credit the artist when using images from the Internet and know how to explore the rights and permissions associated with an image online. Pupils can make informed choices when communicating online for example selecting the appropriate form of communication for its purpose and audience. They can discuss the use of instant messaging in social contexts, aware of the pros and cons of using such tools. Pupils recognise the approval process that their posts go through and demonstrate an awareness of the issues surrounding inappropriate posts and cyberbullying Pupils become active contributors to a blog, carefully considering their responses to blog posts to ensure that they are always respectful. Pupils understand the implications of inappropriate use of the blog.

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