

Computing Skills and Knowledge Progression

Please note that nationally the skills, progression and knowledge for computing are still being developed by the work of TeachComputing the NCCE (National Centre for Computing Education) and so this is a working document.

There are three stands to the subject of computing

1. Computer Science
2. Digital Literacy
3. Information Technology

Computing as a discipline is a broad mixture of concepts and skills that need to be represented in any structure

National Curriculum Computing programmes of study: key stages 1 and 2

| KS1 | Subject Content |
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| | 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. |

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| KS2 | Subject Content |
| | 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. |

The NCCE have also developed the expansion of these three strands into a taxonomy of ten

| Taxonomy strand | Description |
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| Algorithms | Being able to comprehend, design, create, and evaluate algorithms |
| Programming | Writing software to allow computers to solve problems |

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| Data and Information | How data is stored, organised, and used to represent real-world artefacts and scenarios |
| Computer systems | What is a computer, how do its constituent parts function together as a whole |
| Networks | Understand how networks can be used to retrieve and share information and come with associated risks |
| Creating media | Select and create a range of media including text, images, sounds and video |
| Design and development | The activities involved in planning, creating and evaluating computing artefacts |
| Effective use of tools | Use software tools to support computing work |
| Impact of technology | How individuals, systems, and society interact with computer systems |
| Safety and security | Understanding risks when using technology and how to protect individuals and systems |

This table shows skills and knowledge in the three strands and then mapped to the NCCE Taxonomy Computer Science Strand - foundations

| Cohort | Skills | Knowledge |
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| Year 1 & Year 2 | <p>I can give an example of an algorithm</p> <p>I can explain that an algorithm is a sequence</p> | <p>Understand what algorithms are</p> <p>Understand that an algorithm are precise step by step set of</p> |

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| | <p>of step by step instructions to make something happen or solve a problem. I can create a simple algorithm I can follow an algorithm I can implement an algorithm as program I can create a program from an algorithm that uses a sequence construct. I can create a precise algorithm I can find and fix errors in an algorithm and a program. I can input a program I can create a program that uses sequence I can predict the outcome of a simple program or algorithm. I can recognise that computers don't have a brain and just follow instructions which are programmed.</p> | <p>instructions to do something Understand that algorithms and programs are different Understand the programming construct of sequence Understand the term debug and how to do simple debugging e.g for a bee-bot Understand input Understand that algorithms are implemented as programs on digital devices Understand that when an algorithm is inputted into a computer it's called a program. Understand that programs execute by following precise and unambiguous instructions Use logical reasoning to predict the outcome of a program or an algorithm. E.g. Where will the programmable toy or on-screen sprite end up? Understand that computers don't have a brain and that we have to program them to do things.</p> |
| <p>Year 3 & Year 4</p> | <p>Build on from skills at years 1 and 2 I can read and understand simple programs I can create a program from an algorithm I can match algorithm to code and the reverse of that I can design and create an algorithm to accomplish a specific goal. I can use different input and output devices I can find and fix bugs in my algorithm and program I can create a program that uses the construct of repetition</p> | <p>Build on from knowledge at years 1 and 2 Understand that we create algorithms to help plan and design a program Understand the processes involved in creating algorithms and then implementing them as a program. Understand decomposition. Understand sequence and repetition programming constructs. Understand the forever and count controlled loops. Understand that algorithms are implemented as code and must be precise. Understand input and output (events and actions).</p> |

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| | <p>I can create programs with events and actions</p> <p>I can modify a program</p> <p>I can recognise selection in a program or an algorithm</p> | <p>Understand how to debug algorithms and programs.</p> <p>Understand how a program can be modified by changing parameters e.g. move X steps or turn X degrees</p> <p>Understand selection in algorithms, in programs to alter what happens when a condition changes, e.g. if...then...</p> |
| <p>Year 5 & Year 6</p> | <p>Build on from skills at years 3 and 4</p> <p>I can design and create an algorithm that can accomplish specific goals</p> <p>I can implement an algorithm as code</p> <p>I can work out an algorithm from code</p> <p>I can evaluate different algorithms</p> <p>I can convert existing algorithm from pseudocode into code</p> <p>I can solve problems by decomposing them into smaller parts.</p> <p>I can create a program that uses sequence, repetition, and selection.</p> <p>I can create a program which uses procedures (functions) and parameters</p> <p>I can create a program which uses variables</p> <p>I can use relational operators within my programs</p> <p>I can use logical reasoning to detect and correct errors in programs</p> | <p>Build on from knowledge at years 3 and 4</p> <p>Understand and apply the three main programming constructs, sequence, repetition and selection.</p> <p>Understand how to plan out a program in detail, including task, algorithm, code and execution level. (levels of abstraction)</p> <p>Understand procedures (functions) and variables</p> <p>Understand abstraction</p> <p>Understand decomposition</p> <p>Understand basic nesting</p> <p>Understand input, process and output</p> <p>Understand that pseudocode is the description of an algorithm written in informal language</p> <p>Understand that programs can be “chunked” using procedures and that this is a form of abstraction.</p> <p>Understand that variables can be used to store data of different types. E.g. The score within a game usually consists of name and value.</p> <p>Understand how to use boolean and arithmetic operators e.g.e.g. if score > 5, say “well done”.</p> <p>Understand what will happen in a program or algorithm when the input changes (e.g. sensor, data or event).</p> <p>Understand two-way selection in programs and algorithms, i.e. if...then...else (condition starts action)=</p> |

Digital Literacy and IT Strand - application and implication

| Cohort | Skills | Knowledge |
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| <p>Year 1 & Year 2</p> | <p>I can use a keyboard for typing letters, numbers, symbols, backspace, enter, shift, caps lock, arrows and delete.</p> <p>I can use a mouse moving, dragging, scrolling, double and right clicking</p> <p>I can identify and occasionally use different types of controls such as touch and voice.</p> <p>I can experience a range of digital content such as Images, video, music, text.</p> <p>I can create and edit digital content such as text and images.</p> <p>I can recognise and control programmable toys</p> <p>I can switch on, login etc.</p> <p>I can save and open files</p> <p>I can organise and present simple data and information by collecting, grouping, counting and comparing different types together.</p> <p>I can explain the purpose of information</p> <p>I can identify computing technology at home, school and the wider community.</p> <p>I can contrast digital and manual creation activities</p> <p>I can use technology safely and respectfully</p> <p>I can use information technology with purpose</p> | <p>Understand that a keyboard and mouse is used to control a computer.</p> <p>Understand that controls can be different depending on the device we are using.</p> <p>Understand that there is a range of computing devices</p> <p>Understand that computing devices can be used for creating different media</p> <p>Understand that different apps are used for creating and editing different media</p> <p>Understand how to access computing devices</p> <p>Understand that computing devices have a memory and can store the media that is created.</p> <p>Understand that computing devices can be used to store and process data and information.</p> <p>Understand that data and information can be presented using text and images e.g. pictograms</p> <p>Understand that we use different computing technology in different places beyond school.</p> <p>Understand when to use computing devices for the creation of work/media</p> <p>Understand that you can find information from a website.</p> <p>Understand when it's best to use IT and when not.</p> <p>Understand that IT is everywhere and plays a role in all our lives.</p> <p>Understand that there are many different types of</p> |

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| | <p>I can recognise common uses of information technology beyond school</p> <p>I can explain how these technology examples help us</p> <p>I can explain technology as something that helps us</p> <p>I can locate examples of technology in the classroom</p> <p>I can name the main parts of a computer</p> <p>I can explain that computers are in many everyday devices.</p> <p>I can explain the purpose of information technology in the home</p> <p>I can describe some uses of computers</p> <p>I can identify examples of computers</p> <p>I can identify that a computer is a part of information technology</p> | <p>computers</p> <p>Understand that many everyday devices and toys have computers or are controlled by computers.</p> |
| <p>Year 3 & Year 4</p> | <p>Build on from skills at years 1 and 2</p> <p>I can capture and store digital content using devices including sound, video, images, sensors and controllers. (Includes embedded devices, e.g. An iPad camera)</p> <p>I can make use of the main formatting tools e.g. Cut, copy, paste and text formatting.</p> <p>I can use digital devices to organise and present data and information.</p> <p>I can create multimedia (text, sounds, images, video, 3D objects)</p> <p>I can find suitable information online and use</p> | <p>Build on from knowledge at years 1 and 2</p> <p>Understand and use digital devices to capture and store content.</p> <p>Understand how text and images can be formatted</p> <p>Understand that information is data that has been processed.</p> <p>Understand how to use digital devices to present information and data purposefully. E.g. via an infographic or chart.</p> <p>Understand how to use multiple apps to create multimedia content for a purpose e.g. edit an image using photo editing software.</p> |

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| | <p>this in my work.</p> | <p>Understand internet search technologies and how the results are presented.</p> |
| <p>Year 5 & Year 6</p> | <p>Build on from skills at years 3 and 4</p> <p>I can use collaboration tools</p> <p>I can select and use appropriate communication tools</p> <p>I can select and use appropriate content for a purpose and accuracy.</p> <p>I can use a search engine to find relevant and reliable information and be discerning about that information</p> <p>I can select and use appropriate content and awareness of ownership and copyright.</p> <p>I can use technology safely, respectfully and responsibly.</p> <p>I can recognise acceptable/unacceptable behaviour</p> <p>I can identify a range of ways to report concerns about content and contact.</p> <p>I can explain how data is transmitted and received via computer networks and the internet.</p> <p>I can analyse and evaluate data and information</p> | <p>Build on from knowledge at years 3 and 4</p> <p>Understand how files can be created and stored in the cloud and shared with others in real time so that they can be worked on collaboratively. E.g. Use of Google Workspace to create shared docs and slides.</p> <p>Understand how to communicate effectively in the digital world e.g. using email, Google Classroom and other communication apps to share information.</p> <p>Understand computer networks and how data is transmitted using packets.</p> <p>Understand how the internet works and the different services it provides.</p> <p>Understand how to find relevant, reliable content and be discerning about that content</p> <p>Understand that the content found has ownership and is protected by copyright.</p> <p>Understand and use the internet safely and respectfully.</p> <p>Understand how to be a good digital citizen and where to go for help and support.</p> <p>Understand data and information. E.g. that information is data that has been processed.</p> |

Resources and references

<https://teachcomputing.org/curriculum>

<https://docs.google.com/document/d/1avlz1AlwdK3sh8Svdux4sbC84x6nMidBjuUzqBx8ZWw/edit?usp=sharing>

