

Computing Curriculum Sept 2014

Contents:

- 1 Introduction
- 2 Rationale for curriculum strands
 - a. Multimedia
 - b. Programming
 - c. Online
 - d. Data
 - e. E-Safety
- 3 Skills progression
 - a. Computing Skills
 - b. Learner skills
- 4 Resources and external engagement
- 5 Guide for teaching programming strand
- 6 Guide for teaching Python unit within programming strand
- 7 Collaborative projects

Introduction:

This document aims to present a Computing curriculum for Key Stages 1&2 made up of 5 strands: Multimedia, Programming, Online, E-Safety and Data.

A rationale is presented for the curriculum development and content before skills progressions for each strand are presented. Also included are a series of 'Effective Learner' objectives, which should be integrated into all units.

A section is then presented which lists resources and opportunities for external engagement, which may be used to support, enhance and enrich the curriculum presented.

Each member of staff will need to develop the skills to teach the programming elements of the curriculum and each pupil will need to start their new learning from the simplest level. It is proposed that every year group will start with the most basic units (ie Beebots and Daisy Dino) and progress at an appropriate rate throughout their school experience. As the children go through the school they will build their understanding and knowledge in a controlled and incremental with their experiences. This will give a cycle of teacher development and pupils progression in a realistic way. IW will be available for in school PD and sample lessons if required. IW will track this development and review it in subsequent versions of this curriculum document.

Curriculum rationale:

Multimedia: The multimedia strand of this curriculum is designed to provide pupils with the skills and knowledge to work creatively within a range of media and on a range of technology platforms. By nurturing pupils' creative development in tandem with developing their technical skills of programming, it is hope this curriculum will lay the foundations, and spark an interest, for pupils to pursue their learning within the digital creative domain.

The media types covered are: graphics; text; sound; video; and animation. The curriculum is cyclical such that media types are revisited as pupils progress through the key stages with higher-level objectives in order to show progression. For each media type a range of programs are employed to hopefully prevent pupils' skills and knowledge being tied to a particular program but, rather, being transferable and related to the underlying concepts of manipulating the particular media type.

Both 'apps' and programs are used since this strand is delivered on a combination of iPads and laptops. As such, linking with the data strand of this curriculum, pupils will develop their knowledge of the recording, storage and retrieval of a range of data types on a range of platforms, including the transfer of data.

Multimedia learning objectives are presented for each units, however the units may be thought of as a shell into which the content and topic of the media needs to be decided upon by those delivering this scheme. One suggestion is that the multimedia units are used towards the end of a learning topic so pupils may produce an outcome (a piece of text; a video; a picture etc) reflecting upon, summarising and reinforcing their learning.

Programming: A range of apps and programs are used for delivery of the programming strand of the curriculum such that the development of pupils' skills and knowledge is not program specific but, rather, relates to the underlying concepts of programming and computational thinking, and is transferable to new programming environments as technology, inevitably, evolves.

Given the idea of teaching programming in primary schools will be new to some teaching staff and that to do so may require the development of

technical subject knowledge and experience, this curriculum contains a 'A guide to teaching programming' which may be thought of as a scheme of work to accompany the skills progression. The guide sets out the skills and knowledge objectives for each unit and talks through how these can be met with the technology platform suggested including tutorials for teachers to complete before delivering the units.

An important aspect of the programming units are the 'Coding Challenges' and pupils should be given sufficient time to complete these. These are important since they provide pupils with the opportunity to apply the programming skills and knowledge they have been learning in a novel problem-solving context.

Online: The online strand of this curriculum is designed to provide pupils with the skills and knowledge to effectively and efficiently navigate the Internet and undertake online tasks of communication and data storage. The topics covered within this strand are: websites; email; blogging; research via search engines; video conferencing; and cloud computing.

The curriculum is cyclical such that the majority of topics are revisited with higher-level objectives for progression: for example pupils learn to perform a basic Internet search in Year 3 before learning to employ advanced search functions in Year 5.

Online communication is covered in the email, video conferencing and blogging units and provides scope to target E-Safety objectives regarding our online profile and behaviour in online communities.

It was decided to include a unit on Cloud Computing to introduce pupils to the notion of online storage and retrieval and the emerging trend whereby computers are simply used as gateways to connect to the Internet with applications being run, and files being stored, online. Strict care must be taken in this unit in regard to the security and safety of the material stored.

In a similar manner to the multimedia strand, whilst online learning objectives are provided for each year, the units should be thought of as a shell into which the content and topic needs to be decided upon. However, it might be necessary to discretely teach skills before subsequently employing them within wider learning.

E-Safety: The progression subdivides E-Safety into 3 strands: Critical Thinking and Discernment; Socialisation and Ethics; and Self Protection and Personal Skills.

Since pupils are spending a greater time online and are starting to go online at a younger age, and on a greater range of devices, the curriculum aims to provide pupils with the education they require to help navigate the online world safely and take their place respectfully in online communities.

Data: The data strand of this curriculum aims to provide pupils with the skills and knowledge to enter, manipulate, sort, search and represent data in a variety of formats in a range of programs.

In working through this strand of the curriculum pupils are introduced to the notion of entering data into a program so it may be represented graphically using pictograms or a higher-level means of representation inline with age-related numeracy objectives.

There is significant scope within the data strand for the reinforcement of knowledge covered within programming units, since pupils will have learnt about the creation and assignment of variables - the means by which programs receive data. Similarly the processes of sorting and searching data is essentially achieved with a selection algorithm (conditional statements) i.e. if..... then.... which pupils will have employed in the programs they have written.

In a similar manner to the multimedia strand, whilst data learning objectives are provided for each year, the units should be thought of as a shell into which the content and topic needs to be decided upon. However, it might be necessary to discretely teach skills before subsequently employing them within wider learning.

Skills and knowledge* progression by strand:

Year	Multimedia	Programming	Online	E-Safety**	Data
1	Unit 1: Graphics (Paint Sparkle, Art Set, Whiteboard) Use ICT to generate ideas for their work. Use various tools including brushes, pens, lines, fill, spray and stamps. Use save, retrieve, amend and print. Unit 2: Text (2Simple, Simplemind+) Use the spacebar, back space, enter, shift and arrow keys. Start to use two hands when typing. Word process short texts, rather than copying up	Unit 1: Bee Bots (app) Give and follow instructions, which include straight and turning commands, one at a time. Explore outcomes when instructions are given in sequence. Give a simple sequence of instructions. Unit 2: Daisy Dino/Bee Bots (apps) Discuss/explore what will happen when instructions are given in a sequence. Give a sequence of instructions to complete a simple task.	Websites Talk about websites they have been on. Explore a website by clicking on buttons, arrows, menus and hyperlinks. Navigate 'back' by clicking on the 'back' button. Complete a search under the supervision of adults.	Make decisions about whether or not statements or images found on the internet are likely to be true. Identify different devices that can go on the internet, and separate those that do not. Identify what things count as personal information. Identify when inappropriate content is accessed and act appropriately	Know that images give information. Say what a pictogram is showing them. Put data into a program (pictogram). Sort objects and pictures in lists or simple tables.

	written work.	Instructions use both movement commands and additional commands. Knowledge objectives: Algorithms are sets of instructions for achieving goals Algorithms can describe everyday activities and can be followed by humans and by computers. Computers need more precise instructions than humans do. Computers are controlled by a sequence of instructions.			
--	---------------	---	--	--	--

		A computer program is like the narrative part of a story, and the computer's job is to do what the narrator says. Computers have no intelligence, and so follow the narrator's instructions blindly.			
--	--	--	--	--	--

Year	Multimedia	Programming	Online	E-Safety (Oldham CLC)	Data
2	Unit 1: Sound recording (QuickVoice, Garageband) Use sound recorders, at and away from, a computer to capture and playback sound. Use software to record music and sounds. Change sounds they have recorded.	Unit 1: Daisy Dino Use the 'repeat' (loop) and 'when' (conditional statement) command within a series of instructions. Plan a short 'story' for a sprite and write the commands for this. Edit/refine a sequence of commands.	Email Recognise an email address. Find the @ key on a keyboard. Contribute to a class email. Open and select to reply to an email as a class.	Identify obviously false information in a variety of contexts. Recognise that a variety of devices (XBox, PSP etc as well as computers and phones) connect users with other people. Identify personal information that should	Place objects and pictures in a list or a simple table. Make a simple Y/N tree diagram to sort information. Create and search a branching database.

	Save, retrieve and edit sounds. Unit 2: Video (imovie, camera) Capture video. Discuss which videos to keep and why. Arrange clips to make a short film that conveys meaning. Add simple titles and credits. Select text and make simple changes including bold, italic and underlined.	Unit 2: Move the Beebot (Beebot or app) Generate a sequence of instructions including 'right angle' turns. Create a sequence of instructions to generate simple geometric shapes (oblong /square). Discuss how to improve/change their sequence of commands. Knowledge objectives: Steps can be repeated within algorithms Algorithms can be represented in simple formats [storyboards		be kept private. Consider other people's feelings on the internet. Remember and use <i>Sid's Top Tips</i>.	
--	---	--	--	---	--

		and narrative text] Particular tasks can be accomplished by creating a program for a computer. Some computers allow their users to create their own programs.			
--	--	---	--	--	--

Year	Multimedia	Programming	Online	E-Safety (Oldham CLC)	Data
3	Unit 1: Graphics (Powerpoint etc) Acquire, store and combine images from cameras or the internet for a purpose. Use the print screen function to capture an image. Select certain areas of an image and resize, rotate an image. Edit pictures using various tools in paint or photo-manipulation software. Unit 2: eBooks (Book Creator) Create a new eBook with a front cover and add or remove pages.	Unit 1: Hopscotch app Use a variety of inputs Use the 'repeat' (loop) command within a series of instructions. Use the 'if... then' (conditional statement) command within a series of instructions Unit 2: Logo Write a simple program in Logo to produce a line drawing. Use more advanced Logo programming, including pen up, pen down etc. Write a program to reproduce a defined problem, e.g. geometric	Unit 1: Blogging (Padlet) Navigate to view their class/school blog. Understand that their class/school blog can be updated from a range of devices. Comment on their class/school blog. Subscribe with an adult's email to receive updates about their class/school blog. Unit 2: Internet research Type in a URL to find a website. Add websites to favorites.	Question the "validity" of what they see on the internet. Use a browser address bar not just search box and shortcuts. Think before sending and suggest consequences of sending/posting. Recognise online behaviours that would be unfair.	Choose information to put into a data table. Recognise which information is suitable for their topic. Design a questionnaire to collect information. Sort and organise information to use in other ways.

	Combine text and images within each page and embed sound clips. Add information about the author and title for publishing. Get quicker at typing using both hands. Use different fonts sizes, colours and effects to communicate meaning. Align text left, right and centre.	shape/pattern. Knowledge objectives: Algorithms can be represented symbolically [flowcharts] or using instructions in a clearly defined language [turtle graphics]. Algorithms can include selection (if) and repetition (loops). Algorithms should be stated without ambiguity and care and precision are necessary to avoid errors. Algorithms are developed according	Use a search engine to find a range of media, e.g. images, text. Think of search terms to use linked to questions they are finding the answers for. Talk about the reliability of information on the internet, e.g. the difference between fact and opinion (link to E-Safety)		
--	---	--	---	--	--

		to a plan and then tested. Algorithms are corrected if they fail these tests. A computer program is a sequence of instructions written to perform a specified task with a computer. Programs can be created using visual tools.			
Year	Multimedia	Programming	Online	E-Safety (Oldham CLC)	Data
4	Unit 1: Animation (Stop Motion) Plan what they would like to happen in their animation. Take a series of pictures to form an animation.	Unit 1: Scratch <i>Racing car</i> Navigate the Scratch programming environment. Create a background and sprite for a game.	Unit 1: Emails Log in to an email, open emails, create and send replies. Attach files to an email. Download and save files	Recognise social networking sites and social networking features built into other things (such as online games and handheld games consoles).	Create and search a branching database. Sort and organise information to use in other ways. Create a database from

	Move items within their animation to create movement on playback. Edit/improve their animation. Unit 2: Video (iMovie trailer) Capture video for a purpose. Discuss the quality of videos and chose which to keep and which to re-shoot. Trim and arrange clips to convey meaning. Add titles, credits, slide transitions, special effects and talk about the effect these have on the audience.	Add inputs to control their sprite. Use conditional statements (if... then) within their game. Unit 2: Kodu <i>Single player - free to navigate and avoid danger</i> Create a 3D digital world for a game with land, water and scenery. Add a sprite to their world. Program their sprite to navigate their 3D world with an input. Use conditional statements ('if...then') to create dangerous items in their world.	from an email. Email more than one person and participate in group emails by 'replying to all'. Unit 2: Video conferencing Load and add a contact to Facetime. Make/receive and voice and video call. Adjust the audio/video settings to ensure good quality of the call.	Make judgments in order to stay safe, whilst communicating with others online. Tell an adult if anything worries them online. Identify dangers when presented with scenarios, social networking profiles, etc. Articulate examples of 'good' and 'bad' behaviour online.	information I have selected.
--	---	---	---	--	-------------------------------------

		Knowledge objectives: Algorithms can include selection (if) and repetition (loops). Algorithms may be decomposed into component parts (procedures), each of which itself contains an algorithm. It can be easier to plan, test and correct parts of an algorithm separately. The idea of a program as a sequence of <i>statements</i> written in a programming language [Scratch] One or more			
--	--	--	--	--	--

		mechanisms for <i>selecting</i> which statement sequence will be executed, based upon the value of some data item Programs can be created using visual tools. They can use a variety of control structures [selections and procedures].			
--	--	---	--	--	--

Year	Multimedia	Programming	Online	E-Safety (Oldham CLC)	Data
5	Unit 1: eBooks (Book Creator) Create a new ebook with a front cover and add/remove pages/sub pages. Produce a multimedia ebook combining video, pictures, text and audio Attach author data for publishing and publish book. Unit 2: Sound Recording (QuickVoice, Garageband) Collect audio from a variety of sources including own recordings and internet clips. Create a multi-track recording using effects.	Unit 1: Scratch The Ghostly woods Use external triggers and infinite loops to control sprites. Create and edit variables Use conditional statements Cargo Bot app Use loops and conditions to refine algorithms Unit 2: Scratch Robot Wars Use variables to configure external outputs within Scratch Use external inputs to control external outputs	Unit 1: Internet research Use advanced search functions in Google, e.g. quotations. Understand websites such as Wikipedia are made by users (link to E-Safety) Use strategies to check the reliability of information, e.g. cross checking with books. Use their knowledge of domain names to aid their judgment of the validity of websites. Unit 2: Cloud computing Understand files may be saved off their	Judge what sort of privacy settings might be relevant to reducing different risks. Judge when to answer a question online and when not to. Be a good online citizen and friend, not a 'digital bystander'. Articulate what constitutes good behaviour online. Find and cite the web address for any information or resource found online. Use different sources to double check information found.	Create data collection forms and enter data from these accurately. Know how to check for and spot inaccurate data. Know which formulas to use when I want to change my spreadsheet model. Make graphs from the calculations on my spreadsheet.

	Edit and refine their work to improve outcomes.	Use conditional statements and infinite loops Knowledge objectives: Algorithms may be decomposed into component parts (procedures), each of which itself contains an algorithm. Algorithms can include selection (if) and repetition (loops). The behaviour of a program should be planned. One or more mechanisms for <i>selecting</i> which statement sequence	device in 'clouds' (servers). Upload/download a file to the cloud on different devices. Understand about syncing files using cloud computing folders.		
--	--	--	--	--	--

		will be executed, based upon the value of some data item			
--	--	--	--	--	--

Year	Multimedia	Programming	Online	E-Safety (Oldham CLC)	Data
6	Unit 1: Animation (imovie, Stop Motion) Plan a multi-scene animation including characters, scenes, camera angles and special effects. Use stop-go animation software with an external camera to shoot the animation frames. Adjust the number of photographs taken and the playback rate to improve the quality of the animation. Publish their animation and use a movie editing package to edit/refine and add titles.	Unit 1: Scratch Temple Run Design their own game including sprites, backgrounds, scoring and/or timers. Their game uses conditional statements, loops, variables and broadcast messages. Their game finishes if the player wins or loses and the player knows if they have won or lost. Evaluate the effectiveness of their game and debug if required. Knowledge objectives: Algorithms can be	Blogging (Padlet) Register for a blog: selecting a url and navigate to their blog once it is created. Alter the theme and appearance of their blog, adding background images etc. Create a new post, save it as a draft and publish it. Embed photos, hyperlinks and videos into posts. Reorganise posts and remove posts they no longer want. Like/follow other blogs	Find <i>report</i> and <i>flag</i> buttons in commonly used sites and name sources of help (Childline, Cybermentors, etc) ‘click-CEOP’ button and explain to parents what it is for. Discuss scenarios involving online risk. State the source of information found on the internet. Act as a role model for younger pupils, including promoting <i>Sid’s Top Tips</i>.	Create data collection forms and enter data from these accurately. Know how to check for and spot inaccurate data. Know which formulas to use when I want to change my spreadsheet model. Make graphs from the calculations on my spreadsheet. Sort and filter information. Understand that changing the numerical data effects a calculation.

	Unit 2: Video (imovie) Storyboard and capture videos for a purpose. Plan for the use of special effects/transitions to enhance their video. Transfer footage to laptop or iPad for more advanced editing. Trim, arrange and edit audio levels of video to improve the quality of their outcome. Add titles, credits, transitions, special effects. Export their video in different formats for different purposes	represented symbolically [flowcharts] or using instructions in a clearly defined language [turtle graphics] Algorithms are developed according to a plan and then tested. Algorithms are corrected if they fail these tests. Algorithms can include selection (if) and repetition (loops). A well-written program tells a reader the story of how it works, both in the code and in	and build up their blog content over the year.		
--	---	---	---	--	--

		human-readable comments Computers can be programmed so they appear to respond 'intelligently' to certain inputs.			
--	--	--	--	--	--

Overview of effective learner objectives

At least two objectives should be a focus in addition to the subject specific objectives in each Computing unit.

Ability to work independently	Ability to work with each other	Resilience and Challenge	Creativity	Academic Progress
I can take independent notes at appropriate times I do not rely on the teacher or other students for work	I am willing to work with others I share thoughts and ideas with the rest of the group or class I communicate relevantly within a group	I attempt tasks set or extension work I ask relevant questions of the teacher I engage in different activities and small competitions, accepting and embracing challenges	I can come up with ideas and use these ideas to help myself I am keen to express my ideas in different ways I take other's ideas into account alongside my own I use a wide variety of sources effectively	I am enthusiastic about the lesson and contribute I am keen to improve I understand how to improve

