Education Scotland
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What Digital Learning Might Look Like

Examples of digital literacy and computing science learning at Early, First and Second levels

For Scotland's learners, with Scotland's educators

How to Use this Document

This document has been developed to support practitioners when they are planning learning and teaching of the digital literacy and computing science experiences and outcomes.

The aim of the document is to provide examples of learning activities and how they can be incorporated into a range of contexts at early, first and second level.

The document lists the experiences and outcomes in the left-hand column with suggested learning activities in the right-hand column.

These examples are not exhaustive and are only to illustrate how educators can include the digital literacy and computing science experiences and outcomes into cross-curricular contexts.

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Early Level - Digital Literacy		
Key Concept	**Experiences & Outcomes**	**Examples of Learning Activities**
Using digital products and services in a variety of contexts to achieve a purposeful outcome	*I can explore digital technologies and use what I learn to solve problems and share ideas and thoughts.* **TCH 0-01a**	***When learning about sharing ideas with pictures and videos learners might:*** Gather examples of landmarks and people in the local community by taking screen shots from Google Earth or Apple Maps Flyover Capture photos and videos from a trip out in the local community and then collate and discuss these back at the nursery/class. Learners can then discuss what the image will be used for and if the learners have permission to use or share the image Use multimedia apps, such as Draw and Tell or Chatterpix Kids to express their thoughts and demonstrate their understanding by recording their voice and adding it to a photo to create an animation Choose what images and videos are shared on school blogs or social media that communicate the learners' experiences Record different types of video, including slow-motion and time-lapse, to support investigations in STEM learning, such as: a Venus Fly Trap catching a fly, a spider spinning webs or gravity races with dropped objects. Use digital a device to share media to present information/ideas to their peers, for example a photograph slide show or piece of video recorded on a digital camera/mobile device to the rest of the class, for example: Adventure Ted, home learning, special news from home (family would share the media with educators first) ***When learning about howthings work learners might:*** Play at a 'tinker table' or 'exploration station' where they can explore and experiment with a variety of digital devices, such as: alarm clocks, cameras, stopwatches, calculators, BeeBots and old computers or phones Investigate what is inside different devices using a range of tools and instruments, such as; microscopes, shaving brushes to dust over, magnifying glasses or screwdrivers. Suggest the possible faults and solutions to broken devices, for example:"The BeeBot is full of sand because it took a long turn into the sandpit." Look at online resources that support their understanding of how things work, such as: CBeebies 'Maddie's Do You Know' or YouTube 'Bits and Bobs'

		When learning about understanding routines and procedures learners might Explain their daily routines by creating a digital book, using an app such as Our Story, including photo, voice and video content to bring their routines to life. Learners might describe steps and instructions and order them logically, for activities like the snack routine or getting ready for gym Make selections on an interactive board, for example: choosing from lunch menu by dragging and dropping food choices or sharing preferences during voting activities, such as Walk to School Week or Scottish Book Trust ***When learning about technology that helps us learners might:*** Explore a range of technology that provides support and makes life easier for them and others in society. Learners could start by exploring how the technology we have can provide instructions without text, such as text-to-speech (Immersive Reader) or talking buttons, or help us understand different languages with translation tools, such as Microsoft Translate app ***When learning about imaginative play learners might:*** Play with programmable devices and technology, such as BeeBots and mobile devices, to experience the wonder of technology. This could then lead to learners solving problems in a relevant context to their play, for example: can they help the Gruffalo's Mouse (BeeBot in disguise) find his way back home to the deep dark wood – using simple directional language to guide the Beebot along a path?
Searching, processing and managing information responsibly	I can use digital technologies to explore how to search and find information. **TCH 0-02a**	***When learning about finding information learners might:*** Use the web (with adult support) to search for topical key words (from text on cards/labels) to search for media in relation to the key word, for example: "apples", "flour", "wheat". Learners might then discuss the types of results; this could be text, audio, images or videos. The media found in the search could then be used to support discussion, such as talking about size, shape or colour of fruits found in a search Develop more independence to perform web searches, using smart devices or services such as: Google Home, Apple's Siri, Amazon Alexa, for example "Hey Google, how do you make bread?"

Cyber resilience and internet safety	I can explore, play and communicate using digital technologies safely and securely. **TCH 0-03a**	***When learning about online communication learners might:*** Take part in a video call, using Skype for example, or use a video channel to record and share ideas, such as with Flipgrid. This could be used to let learners hear from learners or experts in another country or to share their own learning, such as about their own community or to find out about foreign communities, cultures and languages. 'Skype-a-scientist' or take part in a Microsoft Educator Community Mystery Skype. This could be used to explore a topic such as 'how we communicate' and drawing comparisons with older forms of communication technology – "what did grandparents use to talk in the past?" Watch a live broadcast, such as during Book Week Scotland ***When learning about staying safe on digital devices learners might:*** Discuss how they use online services, such as YouTube and games, and how they see adults in their life using them: "Mummy uses WhatsApp to talk to her friends." Watch and then discuss online safety videos and activities, such as those found at: Think You Know, UK Safer Internet Day/Centre or BBC Own It 'Will & Ainslie' Explore children's story books that explore online safety, such as Chicken Clicken, Digi Duck's Big Decision or The Internet is Like a Puddle. These books give learners an opportunity to explore and learn about internet safety through stories with the class or on their own Use simple passwords, such as 0000 or 1234, to access the devices they use Discuss who should know a password and how to keep them safe Play memory games, or make up a song, to help develop strategies for remembering a password they use. Such strategies might include a memorable colour and number like "red1"

Early Level - Computing Science

Key Concept	Experiences & Outcomes	Examples of Learning Activities
Understanding the world through computational thinking	I can explore computational thinking processes involved in a variety of everyday tasks and can identify patterns in objects or information **TCH 0-13a**	***When learning about sorting and identifying patterns learners might:*** sort concrete objects in the world around them, such as: Numicon, Cuisenaire Rods, flower petals, magnetic shapes or buttons. Learners might then sort them by shape, size or colour and this will lead to discussions about any patterns that they can identify, such as "two buttons and a flower, two buttons and a flower." explore rhythm and timing to make up their own sound or dance patterns using an app like Google Chrome Music Labs. Music is a relevant and engaging way for learners to explore repeating patterns consider 'When is the fridge most full – at the start of the week or the end and why is this?' or 'Are there more minibeasts in the garden when it is wet or dry – is it different minibeast depending on the weather?' notice the working patterns of adults, such as certain members of staff on particular days or for certain activities ***When learning about steps required to solve problems (algorithms) learners might:*** Discuss and then explain the steps involved in a simple everyday activity, such as; getting dressed, brushing teeth, bedtime routine or making a fruit kebab. Sing songs with repeating actions, such as 'Head, Shoulders, Knees and Toes' or 'Wind the Bobbin Up'. Learners might then explain the steps involved in such activities and share these with other learners or adults; working through the sequence in order and correcting any mistakes the other person makes Explore some of the Barefoot Unplugged resources, for example: Dance Move Algorithms or House Patterns
Understanding and analysing computing technology	I understand that sequences of instructions are used to control computing technology. **TCH 0-14a**	***When learning about programmable devices learners might:*** Play, or 'tinker', with programmable devices just like any other toy in the room during play. Exploring concrete materials, such as Code-a-pillar or Bee-bots is essential to learners' understanding of how devices work Solve simple challenges, such as getting the Bee-bot from point A to point B Play the role of the Bee-bot and try to follow a friend's instructions to move through a course or activity, such as making a model with playdough or drawing a picture they describe.

	I can experiment with and identify uses of a range of computing technology in the world around me. **TCH 0-14b**	***When learning about digital systems in their lives learners might:*** Use technology and systems in the world around them, such as ordering lunch from the computer and this can be developed by using simple visual cues like Boardmaker symbols or visual timetables about daily routines Practice moues control skills, which might be unfamiliar to them, using activities, such as CBeebies colouring games or Crickweb drag and drop mouse games
Designing, building and testing computing solutions	I can develop a sequence of instructions and run them using programmable devices or equivalent. TCH 0-15a	***When applying their skills and knowledge about Computing Science learners might:*** • guide the Gruffalo's Mouse (Bee-bot in disguise) find his way back home to the deep dark wood • help the Code-a-pillar pick a safe route to cross the road while avoiding hazards • build a bridge with Lego for the Bee-bot to cross Learners might work through a process of: • discuss the problem • design and test a solution • identify any errors and possible solutions • persevere until a solution is reached Learners can also explore the process parallel to other, real-world activities, such as manoeuvring around an assault course, making a sandwich or building a house with construction blocks. ***When learning about instructional language learners might:*** Use simple 'visual programming languages' with pre-reader coding activities, for example Code.org or Scratch Jr. Learners might develop their understanding from concrete objects to pictorial representations through solving simple puzzles with simple directional symbols in these games

First Level - Digital Literacy		
Key Concept	**Experiences & Outcomes**	**Examples of Learning Activities**
Using digital products and services in a variety of contexts to achieve a purposeful outcome	I can explore and experiment with digital technologies and can use what I learn to support and enhance my learning in different contexts. **TCH 1-01a**	***When learning about tools that help us learners might:*** *Use the iPad Measure app alongside traditional measuring instruments, such as tape, ruler or metre stick, to measure everyday objects* Use the stopwatch app on a digital device to measure time during P.E. when running races or taking turns with equipment Create a spreadsheet, using Excel or Sheets, to keep a record of times throughout the term Use the slow-motion video or photo bursts functions on a device's camera to determine who was first to cross the line in a race or whether someone's foot crossed the line before jumping Use the time-lapse video recording function to detail the direction of the sun when exploring how shadows work Use the slow-motion in order to examine how surface tension is present on water when popping a water balloon (see Slow-Mo Science on Apple Books) Access class novels and reading books in a range of formats, including audiobooks, Office Lens or a built-in screen-reader (such as on iPad or in O365 Word). Learners can use these tools to personalise their learning and are especially effective in supporting emerging readers, those with speech and language needs, or speakers of a foreign language

		When learning about online communications learners might: Access learning through online collaboration sites, such as Microsoft Teams Google Classroom. Learners might complete a reading comprehension activity with questions or peer assessment through sharing a digital text and then receive feedback from the teacher on the site contribute examples of learning updates to the class blog, this could be a video of a drama sequence, a song written about topical learning or an animation explaining what they've learned ***When learning about sharing their ideas and thinking learners might:*** Create texts in different media, such as a class news report with a green screen where they have a background to simulate a report from an exotic or dangerous location, such as the moon or a volcanic eruption Use apps, such as Chatterpix, Talkr, Sock Puppets or Puppet Pals, to create short films that demonstrate their skills or understanding of a topic, for example: French vocabulary, explaining a maths process or a HWB drama on friendship Present information in a chronological sequence, with PowerPoint or Keynote, including relevant images and information about events in a topic, such as The Romans or Our Local Area Create a collection of information in an organised (but non-chronological) format, such as a table about animals for Science, with data, including: number of legs, habitat or species
Searching, processing and managing information responsibly	Using digital technologies responsibly I can access, retrieve and use information to support, enrich or extend learning in different contexts.**TCH 1-02a**	***When learning about locating useful information learners might:*** Use a web browser, such as Safari or Chrome, to find pictures, videos and games to support topical learning, for example: a picture of a Roman soldier or the inner workings of a volcano Use common reputable sources of information, such as BBC or Simple Wikipedia, and explain why they are considered reliable Search for places and information on Google Earth or Apple Maps Flyover to learn about different locations across the world

		When learning about copyright and ownership learners might: Use the 'Insert Online Pictures' option in Word, or Insert Image From the Web option in Google Docs to use images that are copyright-right free (creative commons option is automatically selected) Select 'copyright free images' when using Google Image Search and explain the reasons for doing this, for example: "The photo belongs to someone else and we need their permission to use it."
Cyber resilience and internet safety	I can extend my knowledge of how to use digital technology to communicate with others and I am aware of ways to keep safe and secure. **TCH 1-03a**	***When learning about Health & Wellbeing learners might***: Explore friendships and discuss 'who are our friends' and 'are people we meet online really friends?' Identify ways to be kind to their friends online as well as in the playground, such as including them in online games or chat groups Explain how to respect themselves and others on digital platforms, such as games and social media Look at how the use of technology and online networks to support different groups of people, including ASN, LGBT or ASL Update a log of achievements, or Learning Journey, in an ePortfolio, such as Glow Blogs, Google Sites or Seesaw Investigate how much sleep, eating or exercise is best for their health and produce a timetable to plan and track this using a spreadsheet, such as Numbers or Excel

		When learning about Internet Safety learners might: Describe the features of their secure and unique password and why it might be difficult for others to guess Develop a class/school charter on digital and online use, with digital leaders leading learning for younger learners as part of CR:IS learning on internet safety and use of sites, such as Google Interlands and ThinkUKnow Discuss the risks and benefits of using online platforms, such as Google Classroom or Microsoft Teams, Explore their 'digital rights' and linking this learning to the YoungScot 5 Rights

First Level - Computing Science		
Key Concept	**Experiences & Outcomes**	***Examples of Learning Activities***
Understanding the world through computational thinking	I can explore and comment on processes in the world around me making use of core computational thinking concepts and can organise information in a logical way. TCH 1-13a	***When learning about Computational Thinking learners might:*** Work logically to find errors in Numeracy & Maths problems Use their emerging computing science knowledge, especially decomposition and sequencing, to develop their understanding of mathematical processes, such as multiplying two-digit numbers or explaining next step in patterns and sequences, for example: "the biggest number goes on top, then you start with the units and take the bottom one away from the top one and put the answer under the line and then move on to the tens and do the same thing." Play coding games, such as those at Code.org, which offer great problem-solving exercises around direction, angles, pattern and logic Make decisions based on logical thinking, for example, such as "Collect balls in the gym hall but NOT basketballs" or "Line up if you are left-handed OR have green eyes." Explore Barefoot Unplugged resources where they need to write, draw or talk their way through problems in logical steps and collaborate with peers to solve a range of problems with the emphasis on working for accuracy instead of 'rushing to finish' ***When learning about Sorting and Ordering Information and Data learners might:*** Collect and organise information on different plants or animals to create a Top Trumps-style game where they collect and organise data from class surveys about favourite things like fruit, films or books and then use this data to inform decisions in the school, for example: "Oranges are the favourite fruit in the class, we can make sure there are oranges in the lunch hall." Explain to the learners that they are surveying that they don't have to participate in the survey and that all data will be kept in their jotters and only used for the purpose of the exercise. If data is going to be captured digitally, it should be explained that this will be deleted when no longer needed

		When learning about* Analysing and Creating Instructions *learners might: Analyse a set of instructions that are deliberately wrong, such as how to get to the library, and can identify the points that are wrong and then correct these steps to make an accurate route and is there more than one route or method? Ie. The route from primary 1 to the gym hall is probably different from primary 5 classroom? Analyse a set of given instructions for a beebot, or directions for a partner, and predict the end result – will the beebot arrive at the correct location? Investigate patterns and instructions in well-known songs, such as Ten Green Bottles or the Hokey Cokey, and predict the next verse or progression – what comes after the right hand in-out? Write a list of logical instructions (algorithms) around daily routines, such as making toast, or explaining how they completed an experiment/process in Functional Writing. There are many 'unplugged' resources like this on Barefoot.com
Understanding and analysing computing technology	I understand the instructions of a visual programming language and can predict the outcome of a program written using the language. **TCH1-14a** I understand how computers process information. **TCH1-14b**	***When learning about* Coding & Programming *learners might:*** Tinker with programmable devices, while introducing a new level of complexity, such as an app to control the device or more functions, i.e. Sphero or Dash & Dot. (concrete) Play with and explore new physical computing devices, such as Sphero and Dash & Dot and are able to control them with an app. They should be able to use these devices to navigate obstacle courses, play games, such as bowling and races. (pictorial and abstract) Identify basic functions of a coding language, such as code.org or Scratch – for example, there are 'movement', 'control' and 'loop' blocks and say what these do Use block code to solve simple logic problems, such as playing code.org Hour of Code or Kodable games Analyse a set of instructions and then identify and fix errors; the teacher presents a short section of block code (eg Scratch Jr/ Scratch) and asks the learners to predict where the sprite will end up on the screen. The challenge could be getting from the school to the shop along a safe route. Look at a short algorithm, or set of instructions, and identify if it will work as required or if it needs modification – this could be simple challenges on code.org or Kodable

		When learning about* How a Computer Works *learners might: Explain that input devices are user-controlled and send instructions to the computer's 'brain', or processor, which then leads to an computer-controlled output – a short topic around 'what a computer is' would be effective in ensuring learners can identify basic components, such as input and output devices and processors Create content for a wall display, such as a labelled diagram of how popular devices work in terms of input -> process -> output, for example: when you press the volume button on the TV and the TV follows its algorithm to decide it needs to turn the volume up and then the loudspeaker gets louder
Designing, building and testing computing solutions	I can demonstrate a range of basic problem-solving skills by building simple programs to carry out a given task, using an appropriate language. **TCH 1-15a**	***When applying their skills and knowledge about Computing Science learners might:*** Apply their knowledge and understanding of computational thinking and programmable devices in fun and relevant ways. This could be through contextual challenges, such as: • Lego WeDo challenges – these require learners to develop a solution to a challenge, then build the model and create code to control it • Robot Olympics – learners must control programmable devices to complete challenges, such as slalom, flat races or robot football • As part of a road safety topic, learners guide a Beebots from point A to Point C or create a short script in Scratch Jr that moves their character from one point to another, avoiding the obstacle B – demonstrate a safe route to school on a map/model, add temporary obstacles like roadworks, parked trucks delivering to shops. ***In designing Computing Science challenges, ensure that:*** Through these challenges, learners will create courses for each other that allow for decisions and choices to be made – "should I go left or right to avoid the obstacle?" or "is it better to go fast or slow through the cone slalom?" Learners will discuss the problem, design and test a solution and then identify any errors and possible solutions. This will provide an opportunity to promote perseverance until a solution is reached. These processes can be explored parallel to other, real-world activities, such as manoeuvring around an assault course, making a sandwich or building a house with construction blocks Learners can compare their instructions with other learners' - are all scripts the same? Is it possible to have different instructions for same outcome? Are there patterns?

Second Level – Digital Literacy		
Key Concept	**Experiences & Outcomes**	**Examples of Learning Activities**
Using digital products and services in a variety of contexts to achieve a purposeful outcome	I can extend and enhance my knowledge of digital technologies to collect, analyse ideas, relevant information and organise these in an appropriate way. **TCH 2-01a**	***When learning about Literacy & English learners might:*** Create a range of texts that are increasingly collaborative and multi-modal, for example: writing and recording a song with metaphors and similes or creating a podcast for World Book Day with an app such as GarageBand; creating and publishing a book about Rabbie Burns for Scots Language Week using an app such as Book Creator online Record and use increasingly accurate data from apps, such as Google Science Journal, to measure the exact amount of light that a plant receives during the day or acceleration and speed of their K'nex model car - this data can then be included in reports, perhaps as a graph or chart Produce short films, whether live-action or animated. These films will include all the elements of writing, such as setting, characters, dialogue and plot – this will be demonstrated through an increasing understanding and application of sounds used, editing, pacing and scenes/shots. Learners will make links to the job roles involved in digital filmmaking, for example: producer, director, photographer, digital effects artist, animator, sound engineer Demonstrate their comprehension by creating a quiz about their reading book using online FormsCcurate a journal to keep a record of learning new concepts and/or revision, such as with ePortfolios or Microsoft OneNote ***When learning about Social Studies learners might:*** Use an online storage and collaboration space, such as Google Classroom or Microsoft Teams, to access learning, complete tasks and receive feedback. Use an online map, such as Google Map, to plan or research a school trip. They will be able to calculate large areas, identify the distance and estimated time and propose a method of travel

		Create graphs from surveys about relevant real-life contexts, such as 'Cycle to School' using software such as Numbers, Excel or Sheets. They will then demonstrate their understanding of the data by selecting the most appropriate graph for the gathered data, and collaborate digitally to analyse next steps, or make recommendations based on the data, for example: "We should have more oranges available at lunch time as they were the most popular fruit in our survey." Organise photos and videos in an app, library or folder to demonstrate understanding of topic, such as Plants in Our Local Area Explore different roles that people play by playing simulation games, such as the Be an MP for a Week UK Parliament website Make use of digital connectivity with apps, such as Skype, to connect with a real/relevant audience such as learners and experts from across Scotland and around the world, to discuss and share topical ideas and potentially solve problems, such as those relating to climate, environment and culture
Searching, processing and managing information responsibly	I can use digital technologies to search, access and retrieve information and am aware that not all of this information will be credible. **TCH 02-02a**	**When learning about web searches learners might:** Search for and locate information on the web, such as 'The Vikings', and make sure to locate information on at least three different sites in order to ensure accuracy. They will then be able to compare different information and ask questions about the reliability or online sources – why might this be? Are some sites more reliable than others? Discuss online representations, such as how people are portrayed on social media, 'airbrushed photos', and 'fake news'. They may discuss how online perceptions and interactions shape our thinking and feelings (unreality) – are celebrities healthy, happy or normal role models? Use search tools, such as 'advanced options' and +/- beside words to make searches more accurate, for example Google "viking -tyres -office –cruises" to find information on The Vikings but excluding Viking Tyres, Viking Office Supplies and Viking Cruises. They may also select Google Advanced Search settings for similar options Use Google Photos app to identify plants and animals in their photographs

		When learning about copyright and ownership learners might: Include a reference to all sources in all research presented including links to source material, for example 'image from Getty Images' Use web searches to identify and use appropriate media to include in pieces of work, such as the BBC sound effects library to find audio for (http://bbcsfx.acropolis.org.uk/) stop-motion animations or live action films Use a search engine, such as Google or Creative Commons website, and using the advanced options/tools to filter images or videos which are available for reuse. The teacher should explain the reasons for doing this, for example: "The photo or artwork belongs to someone else and we need their permission to use it."
Cyber resilience and internet safety	I can explore online communities demonstrating an understanding of responsible digital behaviour and I'm aware of how to keep myself safe and secure. **TCH 2-03a**	***When learning about internet safety learners might:*** Make links throughout all of their HWB learning to digital aspects of their life, following the code of: Be Safe, Be Smart, Be Kind. Access resources such as Think U Know and BBC Own It and are able to discuss internet safety and make relevant links to real life experiences, for example: "I know that I shouldn't share my social media passwords with people in case they steal my information or send mean messages from my account." Explore links between internet safety and online shopping in their Maths 'money' learning. This might be identifying good habits for online safety or exploring cyber security aspects, such as encryption and cyphers Discuss the difference between friends (someone you know and have met) and online acquaintances (people you have met online and may not be who they say they are). Suggest good internet etiquette, such as ways of behaving kindly to others online or supporting friends who are not feeling excluded or picked upon online As Digital Leaders, hold Cyber Resilience and Internet Safety (CR:IS) assemblies to raise awareness amongst parents and peers about risks and safe practice online

Second Level – Computing Science		
Key Concept	**Experiences & Outcomes**	**Examples of Learning Activities**
Understanding the world through computational thinking	I understand the operation of a process and its outcome. I can structure related items of information. **TCH 2-13a**	***When learning about Computational Thinking learners might:*** Identify when and where parallel processes occur; such as in Pacman: learners can identify two parallel algorithms, explaining what the Ghosts' role in the game is vs Pacman's role. An unplugged context for this learning might be learners explaining the different parallel roles in a game of rounders to younger peers: one team has instructions for batting while the other has rules for fielding but both play at the same time Use the language of patterns and abstraction to identify when repeated instructions can be grouped into a loop, such as when describing dance steps: for example the Slosh or Macarena, and instead of instead of [ahead 2, turn 90, ahead 2, turn 90, ahead 2, turn 90, ahead 2, turn 90] we could use [ahead 2, turn 90, repeat 3 times] Analyse a set of conditional instructions, for example, what conditions cause the player to win or lose in a game of Draughts, for example: if you lose all your pieces then the game is lost but if you take all the opponents' pieces then you win. With this understanding, they will then design a board game that must contain a random element, such as: a roll of a dice or draw of a card. Learners will be able to ensure that the game is still playable and fair, for example: rolling a 1 will lose points, or send you back but does not immediately eliminate you from the game, or in Snakes and Ladders, having more ladders than snakes so that the game is easier to win Locate specific books when they visit the community library by making use of genres and sub genres to locate fiction, and the Dewey Decimal System to locate and categorise non-fiction Make informed decisions based on the information available when organising an entrepreneurial activity, such as Make £5 Grow. They can weigh up their options and make logical decisions, such as: should we sell lots of small-profit items such as rubbers and pencils, or big-profit items such as t-shirts and cakes? Learners will be able to justify their decisions in their 'business plan' while acknowledging that there are many ways to make profits

		Collect and organise information in a hierarchical structure, and order data within this, such as when sorting sweets: is it chocolate or chewy? Is it more or less than 30g? Or book reviews could be sorted by genre, length or if it contains pictures? Create a collection of information, such as different animals and their scientific classifications. This data could be presented in Venn or Carroll diagrams before being made into Top Trump-style cards. The next step for learners will be to create a digital version of their Top Trumps game using a database or non-linear presentation and categorising the living things in a way that they can be searched, sorted and organised Use effective questions to make decisions to organise most effectively or make recommendations to meet a requirement, so is instead of asking "Would you like ham on your sandwich? Would you like cheese? Would you like peanut butter? Would you like chicken?" they would ask "What would you like on you sandwich?" Analyse a set of more complex instructions, such as a baking recipe to make scones, and ensure the steps are in a logical order Check steps, carry out processes and evaluate processes they carry out. They will then identify where they have made errors or could improve their outcome, such as with scones, by doing things differently next time
Understanding and analysing computing technology	I can explain core programming language concepts in appropriate technical language. **TCH 2-14a** I understand how information is stored and how key components of computing technology connect and interact through networks. **TCH 2-14b**	***When learning about* Coding & Programming *learners might:*** Play with and explore new physical computing devices, such as Makey Makey and Micro:Bit. Code Club has great resources for making games like Frustration or Snake with motion controls Use block-based coding applications, such as Scratch, to create animations and simple games Program parallel scripts, such as: a Scratch game like Flappy Birds, where there is one script for the background and another for the bird they control Identify each part of a script they have written and its function, such as: "This is the loop where the character moves in a square." how a script should work, debug it and describe the expected outputs. This could be developed by presenting programming concepts at assembly, marketing their game to another class, working as a leader in a school code club

		Use these games as a base to understand the new device and its functions but be encouraged to tinker with the code and functions to create something new Identify and use variables and loops in their coding, I.e. a score, timer or lives in a Scratch script. Learners are able to edit and create simple HTML code using tools such as trinket.io They could follow the activities from https://docs.trinket.io/getting-started-with-html and remix the example page to present information about a topic. ***When learning about Binary during Numeracy lessons, learners might:*** Demonstrate with concrete materials how the binary system works, see https://csunplugged.org/en/topics/binary-numbers/ form the CS Unplugged website (National Technologies Community link in Glow). This has a great set of resources (activities tab) for ages 7 and upwards around practical learning activities to do with binary. Represent numbers from 0-20 with binary digits. This could be used to create codes or ciphers (linking to cyber security and CR:IS) or historical figures such as Alan Turing and WW2 code-breakers. (*ASCII for text could be explored for confident learners) Explore other alternative number systems, such as hexadecimal (Aztecs?). Where does Zero come from? ***When learning about Hardware & Storage learners might:*** Demonstrate their understanding of the internal workings of computers, tinkering with the insides of an old computer or broken devices. They might be familiar with some of the internal parts at this stage and might now be wondering how the different parts are connected and controlled Investigate the role of the: motherboard, processor, memory (RAM and ROM) and storage (hard drives, data sticks etc) graphics cards or power supply for example. They might then collect images and data about each component, and then labelling a photograph or pointing at the demo computer, to show the location of each part Discuss tablets and phones – do they have same components as traditional computers? What needs to be altered to fit this hardware into a phone or tablet computer?

		Research how the different components of computers interact with each other and their learning could be demonstrated with a presentation, animation or role play: "HI, I'm the mouse, I take you movement and pass it to the processor" (passes information to next learner), "Hi, I'm the processor, I take the information from the mouse and decide what to do with it – I'll look into the OS program and check – now, I can pass it onto the monitor to display." ***When learning about Networks learners might:*** Research computer networks and listing some of the different types, such as wide-area (WAN) and local area (LAN) role play the steps in data transfer across a network, such as the internet, with learners playing roles such as client, server and DNS and passing pages of information between them Ro on a network hunt where they go around each room in the school and map out all the devices and their connections to the internet Discuss how the school network connects to the internet and manages all the devices connected to it ***When learning about Cyber Security learners might:*** Research different cyphers used in cryptography, such as a Pigpen or Caesar cypher, and encode messages suing these Solve cryptography problems using mathematical reasoning Create and test secure passwords using rules to ensure they contain a range of character types that are not easily predictable, such as punctuation, capital letters and numbers Investigate different online scams, such as phishing emails, and then create a guide on how to identify possible scams and how to avoid falling for them

Designing, building and testing computing solutions	I can create, develop and evaluate computing solutions in response to a design challenge. **TCH 2-15a**	***When applying their skills and knowledge about Computing Science learners might:*** • create simple scripts, with block-based code (see Code Club tutorials for ideas) and can modify them to meet the requirements of challenges, such as: • build a Lego WeDo device to meet First Lego League challenge that includes use of sensors and motors • create a K'Nex vehicle and power it with a Sphero, as part of a topic on transport, incorporating elements of autonomous vehicles such as sensors to determine an unexpected obstacle • as part of a road safety topic, move a sprite in Scratch from point A to Point C, avoiding the obstacle B – demonstrating a safe route to school on a map. CPU controlled sprites could be added to create temporary obstacles like other road users or animals (Crossy Roads/Frogger games) • design and run a 'robot Olympics/sports day' – races, battling or moving accurately through a course • build a model of a smart home with a micro:bit or Makey Makey controlling sensors, such as thermostat, light or air sensors and managing appliances, such as lights, heating and vents • design and build a working app with Apps for Good that helps them with their learning, such as a times table app • use Code Club online activities to edit HTML. These activities include remixing HTML pages to create poster for the school disco which could be shared online • create a simple database with unique identification numbers for each entry, for example: there might be two Georges in the class who both have blue eyes and brown hair, so a unique number is required, like with passports ***In designing Computing Science challenges, ensure that:*** Through these challenges, learners should be aiming to tackle a real-world problem, such as transport, sustainable homes or supporting their learning Learners will discuss the problem, design and test a solution and then identify any errors and possible solutions. This will provide an opportunity to promote perseverance until a solution is reached. There should be an element of refinement to their designs at this stage, where learners compare their solutions to others' and try to identify where their solution could be more efficient, for example: using a conditional loop so that their script runs for a shorter time or creating a simpler user interface for their app, website or database.