Sheffield SEND Computing
Scheme of Work
SAMPLE

Sheffield eLearning Service

improving outcomes - embracing technology

Introduction

The **Sheffield SEND Computing Scheme of Work** was written in response to the needs of teachers in special schools teaching pupils with a range of special educational needs and disabilities. It aims to provide ideas, resources and guidance for teaching the Computing Curriculum to learners working at the pre-key stage 1 standards (from the old P5 level) to those accessing work at Key Stage 1 level (plus some extension material up to key stage 2 level).

There is an Engagement Levels Computing appendix for ideas on how to use technology to work with learners who aren't working on a subject-specific curriculum (you can find this in the folder *Other resources*).

The Scheme of Work contains 4 strands, each with a different weighting:

1. **What is a Computer?**
2. **Communication: Multimedia**
3. **Communication: Data**
4. **Programming & Algorithms**

Each strand contains a number of units, and where appropriate includes key Online Safety & Digital Literacy messages with links to extra activities in an Online Safety appendix (you can find this in the folder *Other resources*). This is designed to complement the online safety messages being taught in PSHE, RSE or similar.

The scheme provides the breadth of content that covers the three areas of the national curriculum for computing: Information Technology, Digital Literacy and Computer Science, whilst providing relevance to and meeting the priorities of learners with special educational needs.

Units

Each strand contains of individual units, for example *2c. Photographs, 4a. We control technology, 3b. Sorting*. The number of the unit refers to the strand as per the list above. The majority of the units contain 3 levels of differentiated activities for pupils working at three approximate levels:
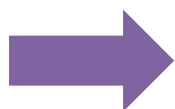
Purple: for students who are ready to start engaging with some subject-specific learning, but need support to access activities. Equates roughly to the old P5-6 levels.

Blue: for students working at the pre-key stage 1 standards, with greater independence in completing activities. Equates roughly to the old P7-8 levels.

Green: for students completing work at Key Stage 1 level of the National Curriculum

Some units may not include activities for all levels, depending on relevance. There are also a small number of extension units, containing activities that are suitable for pupils working above National Curriculum year 2 level (**Red** levels – equating to key stage 2).

Suggested activities:

Each unit contains a number of activities and resources for delivering the content. This provides a number of different ways of teaching the same concepts to pupils whose rate of progress is slower than in mainstream settings.

It is not envisaged that every activity is taught in one go, rather the teacher can choose a suitable task that fits with other topics being taught and the interests and abilities of their students, or to move on from what has been taught previously. During a half-term a combination of units from one strand may be taught to develop knowledge, for example a class might investigate *Algorithms (unit 4b/c)* before applying what they have learnt in programming *Bee-Bots (unit 4d)*. A combination of units may also be used with a very mixed-ability group to ensure all learners are included and stretched.

Cross-curricular delivery:

The scheme was written so that individual units could be taught as part of a wider cross-curricular topic, or to support other subjects such as English, maths

and science together with life skills. Please see the Cross-curricular Topics document (you can find this in the *Planning folder)* for ideas on how to link a selection of common topics with Computing.

Long-term planning:

The computing curriculum should include content from all four strands. Here is a suggested structure and weighting:

1. For pupils in KS1 or working at lower levels (e.g. P5-6 equivalent):

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
What is a Computer?	Programming & Algorithms	Communication Multimedia	Communication Multimedia	Communication Data	Communication Multimedia

2. For KS2-3 pupils working at equivalent P7 and above:

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
What is a Computer? / Multimedia	Programming & Algorithms	Communication Multimedia	Programming & Algorithms	Communication Data	Communication Multimedia

This is only a recommendation, and different cohorts may benefit from a different balance. This scheme works best by matching units to **cross-curricular themes** (see above), and this would determine the order in which strands are taught and the specific units covered. It is envisaged that the *What is a Computer?* strand is taught alongside other strands, primarily at the start of the year to revise key skills with more able learners.

A sample long-term plan for three different pathways is included with the scheme to show effective combinations of units that might fit into a topic (these can be found in the *Planning folder*):

- Informal pathway (4 year rolling program)
- Semi-formal pathway (4 year rolling program)
- Formal pathway at FS/KS1, KS2 and KS3.

Students in KS4 and KS5 can also access the units, but may benefit from a more functional skills based curriculum.

Assessment

Each unit contains progression statements specific to the content that relate to two further documents:

- **Sheffield SEND Computing Progression Framework** – with statements covering the pre-key stage 1 standards (previously P5-8)

- **Sheffield Primary Computing Progression Framework** – covering KS1 and KS2 levels.

These statements can be used to assess progress in the curriculum.

Documents included in the SoW

Document name	Purpose	Folder location
Sheffield SEND Computing SoW introduction	*This document* – to introduce the scheme and how to use it.	Top level folder
Copyright notice	*Please read* – outlines who can access the resources	Top level folder
SEND Computing Unit Overview	Lists the units included in the scheme and the levels of activities in each one.	Top level folder
Individual core units	Content for each unit in each one of four strands aimed at the majority of learners	Core units > *individual strand folders*
Worksheets & resources to accompany scheme	These are linked on each unit, but sometimes due to a Google Drive update, these links no longer work so you can find them here.	Core units > Scheme of work resources – core units
Individual extension units	Content for each unit in each one of four strands aimed at learners working at key stage 2 level.	Extension units > *individual strand folders*
Scratch Programming lesson plans	Full lesson plans and slides for students working at key stage 2 level.	Extension units > 4 Programming extension > Scratch lesson plans

ComputingOverview_ informal	Long-term overview for pupils working on an informal pathway	Planning documents
ComputingOverview_ semiformal	Long-term overview for pupils working on a semi-formal pathway	Planning documents
ComputingOverview_ formal	Long-term overview for pupils working on a formal pathway	Planning documents
SENDComputing_Cross CurricularTopics	List of ideas for linking wider curriculum topics to computing units.	Planning documents.
Sheffield Primary Progression Framework	Statements for assessing progression for learners working at primary level.	Progression documents
Sheffield SEND Progression Framework	Statements for assessing progression for learners working below national curriculum level	Progression documents
Online Safety Appendix	Ideas for teaching online safety alongside the units.	Other resources
Engagement Model Computing	Ideas and resources for using technology to support learners working on the engagement model.	Other resources

For more information about the scheme and prices, please email Catherine Elliott, celliott@sheffieldclc.net.

See below for example units

SHEFFIELD SEND COMPUTING SCHEME OF WORK
Unit Overview

1. What is a Computer?

a) Everyday Technology	🟪	🟦	🟩	
b) What is the Internet?			🟩	🟥
c) Key Skills	🟪	🟦	🟩	
EXT: Key Skills for Work			🟩	🟥

2. Communication: Multimedia

a) Art	🟪	🟦	🟩	
b) Sound & Music	🟪	🟦	🟩	
c) Photographs	🟪	🟦	🟩	
d) Films	🟪	🟦	🟩	
e) eBooks	🟪	🟦	🟩	
f) Presenting Information	🟪	🟦	🟩	
g) Working with Text		🟦	🟩	
h) Animation	🟪	🟦	🟩	
EXT: Creative Media			🟩	🟥
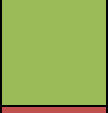
3. Communication: Data

a) Counting	🟪	🟦	🟩	
b) Sorting	🟪	🟦	🟩	
c) Pictograms & Charts	🟪	🟦	🟩	
d) Branching Databases		🟦	🟩	
EXT: Record Card Databases			🟩	🟥
EXT: Spreadsheets			🟩	🟥

4. Programming & Algorithms

a) We control technology	🟪	🟦	🟩	
b/c) Algorithms	🟪	🟦	🟩	
d) Simple Programs: Bee-Bots	🟪	🟦	🟩	
e) Simple Programs: Scratch Jnr		🟦	🟩	
f) Simple Programs: Drawing programs/Logo		🟦	🟩	
g) Simple Programs: Other		🟦	🟩	🟥
EXT: Kodu			🟩	🟥
EXT: Scratch (plus extra lesson plans)			🟩	🟥
EXT: Micro:bit			🟩	🟥
EXT: Crumble Controller			🟩	🟥
EXT: Pro Bot			🟩	🟥

KEY

🟪	Contains activities suitable for learners working at P5-6 levels
🟦	Contains activities suitable for learners working at P7-8 levels or in early years
🟩	Contains activities suitable for learners working at KS1 level
🟥	Contains activities suitable for learners working at KS2 level

1a Everyday Technology

Key learning:

Recognise everyday technology and digital devices that can be used to make things happen and are able to explore these independently and with support.
Choose a device for a specific task from a limited selection, e.g. take a photo with a tablet, play a video on a laptop.

Explore and use a range of technology for a purpose, e.g. to take a photo with a tablet.
Recognise the main parts of a computer including screen, keyboard, mouse / or tablet – screen, button, on screen keyboard.
Recognise that a computer is an electronic device that helps us do things, and common examples in everyday life.
Recognise that we need to follow rules when we use a computer.

Recognise a range of information technology and what it is used for.
Name the main parts of a computer or tablet, including input devices (mouse, keyboard, touchscreen, microphone) and output devices (printer, speaker, screen).
Understand why we have rules when we use computers and how to be healthy when using technology.

Pedagogies:

o	Lead with concepts	Teach the key vocabulary, create concept maps of input and output devices.
o	Get hands on	Allow pupils to get hands on with devices and everyday technology.
o	Make concrete	Make learning relevant to your learners – what is the technology they use everyday, see at home and in the wider world?

Suggested Activities:

1 Have a range of devices to explore in the classroom, e.g. remote-controlled toy, bubble tube, fan, tablet, interactive whiteboard. Encourage pupils to explore these with or without support and make things happen.

2 Create sensory experiences relating to images/models of common technology in the home, school and wider world, e.g. bubbles and washing machine; sound of money and till; car horn and traffic lights.

3 Pupils can match pairs of images of common technology, or an image with sound, e.g. in ChooseIt! Maker. Can pupils indicate what the technology is used for? Try the 'What sound does it make?' activity.

4	Explore technology in school – tour the school taking photographs of technology, e.g. tills, automatic doors, computers, tablets, display screens, walkie talkies, cameras, CD player. Some pupils will be able to take photos with support using a tablet or camera. Add images to flipchart or presentation software to create a slideshow and revisit the objects in class. Can pupils identify any of them?
5	Provide a limited selection of technology and ask pupils to choose one for a purpose, e.g. taking a photo, listening to music, watching a video.
6	Explore technology through specific apps (see list below) – talk to pupils about what they are doing, how they control technology, what it is used for.
7	Create an eBook or slideshow of images of everyday technology, technology in school or the main parts of a computer. Add symbols or a video of Makaton signs to each page. Can pupils control the slideshow using the space bar or switch, and practise the signs for each object.
8	Discuss what technology is – anything made by people to help us. Identify technology in the classroom and take photos or add post-it notes to the objects – see Lesson 1 in Technology Around Us.
8	Discuss what a computer is – an electronic device that helps us do things. Ask students to identify objects or images that are/contain computers and those that don't. Try the sorting activity here: Computing Sorting.
9	Talk about how computers are used in school and at work. Use the BBC Bitesize resource: How do people use computers at work? Create a poster or presentation of devices in different settings. How do students' parents use computers in their jobs? What kinds of jobs use computers?
10	Discuss what pupils use computers for at home. What do they like/dislike doing on the computer? Use images to help guide discussion. This can be used to inform future Online Safety discussions and input. Use the Hello Ruby: Me and the Computer resource.
11	Discuss rules for using technology in school. Create an Acceptable Use Policy – pupils can choose from a bank of images or symbols to create this. See the *Online Safety & Digital Literacy* appendix for more details or an example here. See also Lesson 6 in Technology Around Us.
12	Look at the basic parts of a desktop computer: mouse, keyboard, screen, and create labels in Communicate: in Print or similar. Match images and audio/text in ChooseIt Maker or PowerPoint. If using tablets in school, identify screen, home button, volume control and camera. Use BBC Bitesize: What are the main parts of a computer? to support or Lesson 2 in Technology Around Us.
13	Play the games, apps and activities in the Resources section, and talk about the different computers and technology shown in them, e.g. Nina and the Neurons or the Toca Boca apps. You could take screen shots in the apps and add them to a poster in Pic Collage.

14	What is a Computer? Use the Hello Ruby activities: [3D Paper Computer](#) or [What's Inside a Computer](#) to draw or make a computer. What is inside a computer? What does it look like? Is it magic?
15	What would happen if you made an everyday object into a computer? What would it do? Try the Hello Ruby: [On/Off Button](#) activity. Design an on/off button to add to an object.
16	Discuss Information Technology – a computer or device that works with a computer. Try the activities in Lessons 1, 2 & 3 in [IT Around Us.](#)
17	Simulate a bar code scanner in a shop using the activity in Lesson 4 of [IT Around Us](#). Discuss the benefits of computers and information technology.
18	Discuss the rules we should follow when using IT and how to be healthy using technology. See Lessons 5 & 6 in [IT Around Us.](#) Create a Digital 5 A Day poster – add images to each section of the pie chart, share favourites apps and websites to practice mindfulness, being active etc.
19	Input/output devices: Discuss the different parts of a computer. Which devices give information to the computer or tell it what to do? E.g. to type text or record sound (these are input devices: mouse, keyboard, touchscreen, microphone, webcam). Which devices does the computer use to give us information, e.g. display photos; play music (these are output devices: printer, speakers, screen). See [BBC Bitesize: Input and Output Devices](#). Take photos and create a poster with labels or create a concept map. You could also try the Hello Ruby: [Input or Output?](#) Activity.
20	Recognise common icons used in applications – creating a matching game, an eBook with Makaton signs and symbols, or a poster. Try the quiz at https://www.bbc.co.uk/bitesize/articles/zxbwjxs.
21	Discuss how technology has changed over the years. Discuss whether students' parents and grandparents use computers as children? You could use the Hello Ruby activity: [Future Computers](#) to encourage discussion. Ask students to draw or design computers of the future. What might they do?

See also the **Teach Computing Curriculum** for further lesson plans and Resources (also referenced individually above):
Year 1 – Computing Systems & Networks: [Technology Around Us](#)
Year 2 – Computing Systems & Networks: [IT Around Us](#)

Online Safety & Digital Literacy (see appendix)
- ✓ Discuss the importance of using *Passwords* when you log on to a computer, and keeping them private. What makes a good password? Importance of logging off a computer or account online.
- ✓ Discuss *Responsible Use of Technology*: Ask permission to use technology; take turns with peers; healthy use of technology, e.g. screen time. Create an Acceptable Use Policy for use of computers in school.
- ✓ Discuss use of technology at home and *Online Friends*: What makes a good friend? Who are we talking to online? Being kind online and offline.

There are also a number of activities at [Project Evolve](#) for teaching pupils about Online Safety.

RESOURCES
Websites
[http://www.bbc.co.uk/cbeebies/games/nina-go-digital-game](#) - play the game to spot technology [http://www.bbc.co.uk/cbeebies/watch/nina-and-the-neurons-computers-song](#) [BBC Bitesize: What is a Computer?](#) – simple introduction [BBC Bitesize: How can computers help you learn](#) [BBC Bitesize: How do people use computers at work?](#) [BBC Bitesize: What are the main parts of a computer?](#) [BBC Bitesize: Input and Output Devices](#) – ignore final section [Hello Ruby](#) – Lots of activities around what is a computer.

Software	iPad apps
Out and About 3: Gadgets at Home Switch It! Technology Extra	Washing Machine by Wimbledon Sound Pop-It-Up-Shop - Shopping till – this will scan real barcodes Plum Cooking Elevator Up / Television Time / Mobile Cell Phone - Inclusive Technology apps, which can be switch activated Whoosh On – selection of technology you can turn on and off with sound Toca Town Toca Life: City Toca Life: School

PROGRESSION	
P5-6	- Explore technology - Use different digital devices, e.g. computer, camera, tablet - Recognise different digital devices, e.g. computer, tablet, camera - Recognise that different devices are used for different purposes, e.g. camera to take photo - Choose appropriate technology from a limited selection to fulfil a familiar task
P7-8	- Recognise that you can access content on a digital device - Recognise and use a range of digital devices, e.g. computer, tablet, camera - Recognise commonly used parts of a computer, e.g. mouse, screen, keyboard - Recognise that information and media can be stored on a digital device, e.g. they ask to view a photo that has been taken on a tablet
NC1-2	- Identify and name a range of technologies, e.g. computer, tablet, camera, till - Explain what the basic parts of a computer are used for e.g. mouse, screen, keyboard - Identify and use a range of input and output devices, e.g. mouse, keyboard, touchscreen / speakers, screen

KEY WORDS		
Computer iPad/tablet Switch Mouse	Technology Keyboard Screen App Button Camera Power	Information technology Input Output Printer Webcam Microphone Speaker Printer
Plus everyday technology examples e.g. washing machine, till, bubble tube as relevant.		

2c	Photographs	

Key learning:

View photographs on a theme; choose a photograph from a selection for a purpose; take a photo with support.

Take photos using a camera or tablet; choose images to convey information; apply simple filters to an image in software.

Know how to use a digital camera/tablet camera to take a photo and use the zoom; take photographs on a theme; apply simple edits for a purpose e.g. add a filter, change brightness, crop; recognise that photos belong to the person that took them, and that not all photos are real.

Pedagogies:

o	**Lead with concepts**	Teach the key vocabulary and concepts around photography/images.
o	**Get hands on**	Allow students to tinker with devices and the software and find out what different tools do.
o	**Model everything**	Model how to use any applications and talk about your use of different effects to improve a photo.
o	**Problem-solving**	Discuss what to do if something goes wrong, model use of undo and how to remove any unwanted parts of photos.

Suggested Activities:

For photo editing use an online photo editor (see Resources), the Picture Format tools in PowerPoint or the Photos app in Windows.

1	View a slideshow of photos on a theme or of a recent event on the board with the class or individually on a tablet or computer. Talk about what the photos show with the pupils. Encourage pupils to move onto the next image in the slideshow using an appropriate access device e.g. Switch. See the **Slideshow in PowerPoint guide** in the Resources folder for how to set one up.
2	Ask pupils to choose a photo from a limited selection for a purpose, for example a photo of the pupil to go on their peg; an image from a class trip for a display; a photo to go onto a greetings card.
3	Pupils take photographs using a digital camera or tablet with support where required. Encourage them to keep the device still and to frame the subject. Pupils can choose their favourite photos to display in a poster, slideshow or calendar on a theme, e.g. people, classroom objects, food and drink.
4	Use Photobooth on the iPad, for pupils to investigate different effects on their own image. Model how to take photos in Photobooth and choose

	effects. Photo Lab Picture Editor and MQRD have good effects, but need supervision. Add to a poster to illustrate emotions.
5	Take freeze-frame photos of pupils acting out an action, part of a story, an event or emotion to be used in a display, presentation, poster etc.
6	Create a collage of photos in PowerPoint, Pic Collage or using an online tool, on a theme, e.g. animals, colours. Pupils can choose from a selection of images and arrange on the page with support. Use the Search Tools > Colour on Google Images to find images of only one colour.
7	Use the following software to create activities using photographs to reinforce the topic being studied: o Jigsaw Maker o SwitchIt Maker slideshow o ChooseIt! Maker o Drawing Pad (iPad - add photo as background for pupil to draw over) o Chatterpix Kids (iPad - take a photo of the pupil or object, add a mouth, then record the pupil talking or making sounds) o Photofunia (iPad) – add a photo to a large number of templates
8	Create an avatar or talking object using Chatterpix (iPad) or Voki (http://www.voki.com/) to encourage speech/vocalisations.
9	Create a Photostory (slideshow) on a topic: pupils choose or take photographs, add to software with support (e.g. PowerPoint, Google Slides) Some pupils may be able to apply simple effects and filters, or add basic text labels. For example to show different festivals, tell a ghost story, retell an event. See the **Slideshow in PowerPoint guide** in the Resources folder for how to set one up.
10	Take photographs around school or outside using a digital camera or tablet on a theme (for example materials / seasons / mini-beasts / shapes). More able pupils should pay attention to composition and experiment with different angles and close up. Choose the best photographs and add to a slideshow or poster.
11	Create a postcard or greetings card, using an edited photograph with simple text in a template. See the online tools in Resources.
12	Take photographs of the class against a plain background and upload to the computer. Use the *Remove Background* tool in PowerPoint to cut out pupils and add a different background behind. Add Word Art to create a book cover (for example for World Book day), or text boxes and a black and white filter to make a newspaper page (e.g. reporting space landings, a natural disaster or a profile of a famous person). Pupils will need support to do this. See the **Editing Photos in PowerPoint guide** in the Resources folder for information about the *Remove Background Tool.*
13	Create images using Generative AI to prompt a discussion around what is real and not real when viewing images online. See tools in resources below. See also Lesson 6 in the Teach Computing unit Digital Photography.

	Note *these tools are generally 13+ (with parental consent required for under 18s) – best to use in a class activity, led by yourself.*
13	Use basic tools in editing software to improve a photograph that pupils have taken, for example using different filters, crop, exposure, brightness. Save and display photos, either as print outs or online. For example, create a class Flickr or Google Photos account, or add to a class blog. See also Lessons 1-5 in the Teach Computing unit Digital Photography.
14	Create a piece of art by adding a photograph to photo-editing software and applying filters to change how it looks. This could be done in PowerPoint using the *Artistic Effects* in *Picture Tools*, and then creating a repeating pattern using different filters. See the **Editing Photos in PowerPoint guide** in the Resources folder. Similar effects can be created using the online tools in resources, e.g. create some Pop Art.
15	Search for photographs on a theme online, using Google or Bing image search, or similar. Model safe searching and investigate the Advanced Search tools to specify a size or colour. Discuss copyright. Copy images and paste into a document or presentation.
16	Explore the tools at https://bighugelabs.com/ - create a Hockney inspired collage, magazine cover, movie poster or piece of Pop Art.

See also the Teach Computing Curriculum for further lesson plans and resources:
Year 2 – Creating media: Digital Photography

Online Safety & Digital Literacy (see appendix)

✓ Discuss *Personal information* and what you should share online. What can happen if you put your photograph online? Discuss how photos can be changed. Ask permission when you take photos of other people.

✓ Discuss inappropriate images and copyright in relation to *Searching for information online*. What should you do if you see something that upsets you or is inappropriate? Who owns a photograph? How would you feel if someone used your photo without asking?

✓ Discuss how some images can be changed and not everything you see is real.

There are also a number of activities at Project Evolve for teaching pupils about Online Safety.

RESOURCES

Websites

www.ribbet.com – Free photo-editing software
www.befunky.com – Free photo-editing software, collage maker and a range of templates to make cards, invitations, menus etc.
https://pixlr.com/editor/ - photo editing software
https://www.canva.com/create/postcards/ - Create a postcard (requires login)
https://www.flickr.com/ - Search for and save photos online (requires Yahoo account)
https://photos.google.com/ - Save images online with Google account
https://pixabay.com/ - Royalty free images to use in projects

Generative AI tools:
https://www.craiyon.com/ - Free but lots of ads
https://www.bing.com/images/create - Microsoft account required, free, no ads.

Editing Photos in PowerPoint how to guide
Slideshows in PowerPoint how to guide

Software	iPad apps
Jigsaw Maker	Pic Collage
SwitchIt! Maker	Drawing Pad
ChooseIt! Maker	KidCam – simple camera
PhotoSimple	PhotoBooth
Slideshow Maker	Photo Lab Picture Editor (contains adverts)
Somantics	LiveCollage – Instant Collage Maker (contains adverts)
PowerPoint/Google Slides	MQRD – Live filters
Photoshop Elements	Photoshop Express
Publisher	Photofunia
PhotoStory 3 for Windows	BeFunky
Slideshow Maker	30 Hands *create a*
	Shadow Puppet Edu *photostory or*
	Adobe Spark Video *slideshow*

PROGRESSION
P5-6   - *Explore technology e.g. camera*   - *Operate a digital device with support e.g. take a photo using a tablet or camera*   - *Demonstrate a preference for a photo from a selection*
P7-8   - *Operate a digital device independently to fulfil a task, e.g. take a photo using a camera or tablet*   - *Choose media to convey information, e.g. a photo of a person*   - *Select basic options in a familiar application e.g. filters to change a photo*   - *Choose a digital device from a selection to complete a specific task, e.g. take a photo*   - *Combine photos and text to present information with support*
NC1-2   - *Present ideas and information by combining media independently*   - *Select tools or options to change the appearance of digital content, e.g. filters*   - *Plan out digital content*   - *Edit digital content to achieve a particular effect or improve it*   - *Talk about what makes digital content good or bad*

KEY WORDS		
Computer Photo Picture Camera	Image Edit Close up	Effect Crop Resize Brightness Contrast Copyright Landscape Portrait

| 3d | **Branching Databases** | |

There are strong links with science in this unit – pre-teach any required knowledge to help with categorising objects, animals etc.

Key learning:

Answer yes/no questions to find out information; use a simple branching database to identify an object.

Identify items using a branching database; create a branching database to help identify an item; recognise what questions can be used in a branching database.

Pedagogy:

o	**Lead with concepts**	Teach the key vocabulary and concepts around data and branching databases.
o	**Make concrete**	Ensure examples are relevant and meaningful to learners – harness students' special interests and make sure examples are culturally relevant. Use unplugged activities to model complex concepts.
o	**Scaffolding**	Provide templates for learners to use and modify.
o	**Problem-solving**	Provide learners with databases that don't work and ask them to debug them.

Suggested Activities:

1	Create a human branching database. Place a *yes* card on one side of the room, and a *no* card on the other. Ask a series of questions that have yes/no answers and the students have to move to the correct side of the room. With less mobile students, you could give everyone two cards, or a yes and no recordable button to give the answer. Example questions: *Do you have blue eyes? Do you like cats? Is your birthday in June?* Try asking a question that can't be answered with a yes or no (*Do you prefer cake or fruit?*). Discussion: the questions you ask are important otherwise you won't find out the information. (*N.B. A version of this activity may have been done in unit 3b. Sorting*).
2	Investigate a pre-prepared branching database (see Resources for examples). Can you identify objects using the database? Provide images of the objects/animals at the start to choose from.
Intro	Explain that information can be stored on a computer using a database, and that students are going to investigate a branching database in this unit. We use branching databases to help us to identify objects, animals or people.

3	Students put together a paper-based branching database using pre-prepared printed pictures and questions on a topic, and test out a peer's database to see if they can identify an item.
4	Create a walking branching database in the classroom by laying images or objects on the floor, but leaving out the questions you used to sort the images. Place a recordable button at each branch and ask students to record a suitable question on each one. Test out the database – does it work?
5	Students plan, create and test a branching database on a theme. Identify a collection of objects or animals to sort and source images online – model safe searching. Discuss what their key features are and suitable yes/no questions to ask. Use specific software (e.g. 2Question, j2data.com) to create a database or adapt the PowerPoint in Resources. On a tablet you can create a database using the apps mentioned in the Resources. Test other students' databases to check that they work and give feedback on the questions used. Can students suggest better questions? (Complete the lessons in the Teach Computing Unit Branching Databases).
6	Provide learners with a branching database that contains an error and ask students to debug it.

See also the Teach Computing Curriculum for further lesson plans and resources:
Year 1 – Data & Information: Grouping Data
Year 3 – Data & Information: Branching Databases

Online Safety & Digital Literacy (see appendix)

✓ Discuss inappropriate content in relation to *Searching for information online*. What should you do if you see something that upsets you or is inappropriate?

✓ Discuss *c*opyright – who owns an image? Where can you find copyright-free images?

There are also a number of activities at Project Evolve for teaching students about Online Safety.

RESOURCES

Websites

See the CS Unplugged activities on branching databases.
PowerPoint Branching Database example
J2data Branching Database Creator
Open Clipart – free images
Noun Project – free icons
Fruit branching database
Animal branching database

Software	iPad apps
ActivInspire/SMART notebook 2Question – Purple Mash PowerPoint	Pic Collage Pure Flow Ideament

PROGRESSION

P7-8	*- Sort familiar objects into 1 or more categories independently* *- Answer basic questions about information displayed in images, e.g. more or less*
NC1-2	*- Identify an object by asking yes/no questions* *- Identify an object using a branching database* *- Create a branching database using pre-prepared images and questions* *- Recognise an error in a branching database* *- Independently plan out and create a branching database* *- Recognise that the questions used in a branching database are important* *- Evaluate a given branching database and suggest improvements*

KEY WORDS

Sort Number Image Information Question	Branching database Label Property Data

4d	**Simple Programs: Bee-Bots**

Key learning*:*

Explore floor robots; recognise that pressing buttons will make things happen.

Recognise that we control computers; control a Bee-Bot for a purpose.

Plan out and create simple programs using a Bee-Bot; recognise that we control computers by programming them; identify and correct errors in a simple program

Pedagogies:

- o **Lead with concepts** — Teach the key vocabulary explicitly and introduce concepts of algorithm, sequence, debugging – link with Unit 4b/c.
- o **Get hands on** — Allow students to get hands on with devices and explore what they do – tinkering is an essential part of the learning.
- o **Problem-solving** — Allow students to make mistakes and provide strategies for debugging e.g. tracing the code to find the error. Celebrate debugging and provide specific debugging activities for learners to solve.
- o **Scaffolding** — Allow learners to read code as well as write it e.g. predict the outcome of given code.

Notes

- Ensure you teach the key language and concepts explicitly to students working at National Curriculum levels. Combine these activities with unplugged activities from the **Unit 4b/c Algorithms** to teach about sequence and algorithms – make links with the unplugged activities as you demonstrate the Bee-Bot.

- When creating programs, encourage students to use command cards or draw the arrows on paper in order to plan out the algorithm first as this support them with debugging and problem-solving.

Suggested Activities:

1 Students can tinker with and explore a Bee-Bot, Pro-Bot, Constructa-Bot or similar floor robots. Can they turn them on and make them move? Create a course or grid on a topic (e.g. castles, underwater adventures) and pre-program a Bee-Bot to move to a particular square – ask the student to start the program (i.e. press *Go*). Talk about what happens and where it goes to.

2	Create a number line to practise counting 1 to 5. Program the Bee-Bot to move forward one or more squares and count as it moves. You can also create a linear grid to practise sounding out phonemes in simple words.
3	Create a sensory Bee-Bot course, e.g. spray water as a lake is crossed; build a cardboard car wash and blow bubbles; roar if you reach the dinosaur etc. Program just a single forward move into the Bee-Bot and ask the student to choose where the Bee-Bot starts on the grid and press *Go*.
4	Create a grid based on a story you are reading in English. Program the Bee-Bot to move around the grid in the order of events in the story as you read. Encourage students to anticipate what comes next. Note you can use the *Pause* button to program in a wait at certain points (a pause lasts 1 second).
5	Give students time to tinker with the Bee-Bots or similar floor robot and explore what the buttons do. Ask questions about what they discover, e.g. What do you think the arrow buttons do? Explain that it is a robot – a type of computer - and we control it by giving it instructions by pressing the buttons.
6	Spend time modelling the movement of the Bee-Bot with students. Show the Bee-Bot arrows on screen and practise moving with learners. Emphasise that the right and left arrows mean a quarter turn on the spot, and the Bee-Bot always moves forward in the direction it is facing with its eyes. Example commands can be found in the **Bee-Bot Basics presentation.**
7	Set small challenges on a grid (2 by 3 squares works well) to program the Bee-Bot, e.g. moving forward one square. Provide command cards to plan out the program first before inputting into the Bee-Bot. There is a comprehensive lesson plan on using the Bee-Bot in this way at http://barefootcas.org.uk – see resources. Students at this level may move just one square at a time, rather than planning out a sequence of commands, and will need to make sure they are facing the same way as the robot when planning the next move. Some students may be able to set each other challenges to move the Bee-Bot to a point, and add in obstacles.
8	Show a very short program (1 or 2 commands) and grid on the board and ask students where the Bee-Bot will end up – they can test out if they are correct on their own grids.
9	In 1-to-1 work suggest an incorrect command card to move the Bee-Bot in a certain direction. Can the student spot the error and correct it?
10	Create grids for students to practise concepts from another subject. Practise counting with a number line; spell out high frequency words; practise road safety messages with pedestrian crossings and traffic lights.
11	Students can draw or build their own Bee-Bot grids and mazes based on a cross-curricular theme, e.g. a treasure map, space, myths and legends. They can also create costumes for the Bee-Bot out of cardboard. Students can work with pre-programmed Bee-Bots, program one step at a time through the maze or plan out the algorithm and input on the Bee-Bot to test it out depending on their level.

12	Give students time to tinker with the Bee-Bots or similar floor robot and explore what the buttons do. Ask questions about what they discover and to direct exploration, e.g. What do you think each button does? How far does it move? How do you stop the Bee-Bot (press the Go button again)? What does the Clear and Pause button do? Explain that it is a robot – a type of computer - and we control it by giving it instructions by pressing the buttons.
13	Control students to move around the room using the Bee-Bot arrows on cards or screen – you could create a grid on the floor using masking tape. Emphasise that the right and left arrows mean a quarter turn on the spot and encourage learners to face in the same direction as the robot when planning out movement. Example commands can be found in the **Bee-Bot Basics presentation.**
14	Complete the **Year 1: Simple Bee-Bot Programs** unit from the Sheffield scheme of work (see Resources folder) or the Teach Computing unit Moving a Robot.
15	Students can draw or build their own Bee-Bot grids and mazes based on a cross-curricular theme, e.g. a treasure map, space, myths and legends. They can also create costumes for the Bee-Bot out of cardboard. Set challenges and ensure that learners plan out their algorithm first using command cards or a whiteboard – this will help with debugging.
16	To test understanding provide students with complete programs and ask them to predict where the Bee-Bot will end up. Introduce *debugging* and provide programs containing errors for students to identify the error and correct it. See **Bee-Bot Basics presentation** for examples.
17	Complete the **Year 1: What is an Algorithm?** unit from the Sheffield scheme of work (see Resources folder) or the Teach Computing unit Robot Algorithms.
18	Create challenge cards or dice to accompany a Bee-Bot grid on a theme to challenge more able learners, e.g. *Create a program using the smallest number of moves; Spin around 2 times during the program; Create a program using exactly 8 moves.* There is an online version here: Random Rule Generator
19	Add a pen or pencil to the Bee-Bot and program it to draw out letters, numbers or simple shapes. Make sure students plan out the algorithm first away from the Bee-Bot. There is a lesson plan here for numbers: Barefoot Bee-Bots 123 Programming Activity.
20	Ask students to plan out a Bee-Bot dance using two or more bots moving in unison – see also **Year 2: Extending Programs** unit from the Sheffield scheme of work (see Resources folder) for more ideas on extending learning.
21	Introduce the concept of *Decomposition* – breaking a problem into smaller parts to solve it. Use the resource Barefoot Bee-Bot Decomposition. You could use this to retell a story you are reading as a class in English – create a grid with events or characters from the story, and students program the Bee-Bot to move through the grid in the correct order.

22	Introduce a *Repeat _ times* card when planning out a program – how can this be used to improve the program?
23	The Bee-Bot and Blue-Bot apps can be used to reinforce learning. The latter introduces loops and 45⁰ turns to stretch the more able students.

N.B. Bee-Bot grids are made up of squares 15cm by 15cm. The Pro-Bot requires a grid of 25cm by 25cm squares.

See also the Teach Computing Curriculum for further lesson plans and resources:
Year 1 – Programming A: Moving a Robot
Year 2 – Programming A: Robot Algorithms

RESOURCES
Websites
Barefoot Bee-Bot Basics – Comprehensive lesson plan for starting out with the Bee-Bot, with printable resources. Free login required.   Barefoot Bee-Bot Decomposition – Comprehensive lesson plan on learning about decomposition using a Bee-Bot.   Barefoot Bee-Bots 123 Programming Activity – Program the Bee-Bots to draw numbers   Bee-Bot Command Cards - jigsaw – Printable command cards   Bee-Bot Online Emulator – choose different mats and control the Bee-bot
iPad apps
Bee-Bot   Blue-Bot – This is designed to work with the Blue-Bot robot, but you can use the app on its own   A.L.E.X. – Uses the same directional commands to move a robot around a maze

PROGRESSION	
P5-6	- *Explore technology* - *Make something happen using technology* - *Expect an outcome, e.g. pressing Bee-Bot buttons* - *Repeat an action with technology to trigger a specific outcome, e.g. move Bee-Bot* - *Control technology for a purpose* - *Recognise the success or failure of an action*
P7-8	- *Know that we control computers* - *Follow simple instructions to control a digital device* - *Try alternative approaches to achieve a goal* - *Input a short sequence of instructions to control a device*

NC1-2

- *Know that we control computers by giving them instructions*
- *Create a simple program e.g. to control a floor robot*
- *Debug an error in a simple program*
- *Predict the outcome of a simple program to move a floor robot*
- *Plan out an algorithm or program and evaluate its success*

KEY WORDS		
Computer Button Move	Right Left Turn Forward Backward Instruction Robot	Program Algorithm Sequence Debug