BGE S1-S3

Computing Science & Digital Literacy

Planning & Assessment

Third and Fourth Levels

David Alford

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Contents

How to use this teacher guide

The following series of lessons are designed to provide pupils with the opportunity to undertake all of the Level 3 and 4 outcomes for Digital Literacy and Computing Science in the Technologies Organiser of the Broad General Education. The lessons also provide pupils with opportunities to undertake some Level 3 and 4 outcomes from the Literacy, Numeracy and Health and Wellbeing Organisers. Full details can be seen on the 'Outcome Coverage Grid'.

It is advised that each block of lessons include combinations of the following:

- teacher explanation and demonstration
- questioning of pupils
- cooperative learning (in groups or pairs)
- videos, online research, online games or quizzes
- pupils answering theory questions
- pupils creating projects (and possibly presenting)
- pupils practicing practical skills.

It should be noted that a lot of online quizzes and games use Flash, which will no longer be supported by browsers from 2021. So, if you regularly use these in class, alternatives must be found.

Each block of lessons should include opportunities for personalisation and choice, not only in the games, programs, web pages, databases and/or projects created, but also in lesson content. It is important to listen to pupils in order to shape the course for them. As such, you may wish to include additional lessons not found in this guide, for example how to use an online collaboration tool such as Glow (glowconnect.org.uk), how to use a graphics package to design a game character, or a lesson on cyberbullying.

When pupils create the games, programs, web pages, databases and/or projects, they are covered by an exemption to copyright law that allows them to use copyrighted images, small parts of copyrighted videos and small parts of copyrighted songs and sounds in schoolwork. However, pupils should record the sources of all material so as to undertake outcome **TCH 4-02a** (*I can use digital technologies to process and manage information responsibly and can reference sources accordingly*). In addition, you may wish to incorporate at least one debate between small groups so as to ensure coverage of the listening and talking Literacy outcomes in the 'Outcome Coverage Grid'. For example, in Chapter 2, you could have two groups of pupils argue for and against the implementation of the Internet of Things or have two groups of pupils argue for and against an individual's right to privacy from the government.

The topics can be taught in any order with the exception of Chapters 3–5, where later lessons build on the skills gained in earlier lessons. This pack also includes:

- worksheets for use in class or as home learning
- end of topic assessments
- holistic assessment projects, incorporating practical skills from a number of topics.

It is advised that homework is issued, submitted, marked and feedback returned electronically via Glow, OneNote, Teams or another suitable method. Files to support delivery of the lessons are also included in the folder.

Lesson	Learning intentions	Experiences and outcomes	Key concepts	Teaching notes
1.4 Input and output devices	In this lesson, learners will understand: • different input devices are used to enter data into a computer system. • different output devices are used to provide data to a computer user.	**TCH 3-14b** **TCH 4-14c** **LIT 3-05a / LIT 4-05a (Listening & Talking)**	Sensor Input device Output device	This lesson covers student book pages 8–9. Suggested lesson structure: • **State** the learning intentions, displaying them visibly. • **Co-create** success criteria with learners. • **Question** pupils, asking if they can name anything they think uses one or more sensors. Make a list on the board. • Briefly **explain** the concept of user input, stressing the difference between input and loading from backing storage. **Question** pupils to name input devices and make a list on the board. • Briefly **explain** the concept of output and have pupils **work cooperatively** in pairs to make a list of output devices. • You may wish to show a short suitable video about devices for disabled users, such as www.youtube.com/watch?v=VNX0T_y34dI. • **Student book work:** pupils read '1.4: Input and output devices' and work through the questions. • **Computer work:** pupils work through the Activities in the student book. • **Plenary:** use AiFL techniques to assess understanding of key concepts and evaluate success criteria.

Lesson	Learning intentions	Experiences and outcomes	Key concepts	Teaching notes
1.5 Networks	In this lesson, learners will understand: • the basics of how networks allow data to be shared between devices • the different network connections available.	**TCH 3-13a** **TCH 3-14b** **TCH 4-14c** **TCH 3-02a** **TCH 4-01a** **TCH 4-02a** **LIT 3-06a / LIT 4-06a (Listening & Talking)** **LIT 3-26a / LIT 4-26a (Writing)** **LIT 3-28a (Writing)**	LAN Wireless Wi-fi WAN Packets Internet World Wide Web Browser	This lesson covers student book pages 10–11. Suggested lesson structure: • **State** the learning intentions, displaying them visibly. • **Co-create** success criteria with learners. • **Question** pupils about the previous content, including how computers store information. • **Explain** the concept of communication of information over a transmission medium. • **Question** pupils to name how information might be transferred to or from devices, then make a list. • Briefly **explain** the advantages and disadvantages of wireless and wired communication (some pupils believe any internet connection is Wi-fi). • Briefly **explain** data packets. • Briefly **explain** the difference between the World Wide Web and the internet. • **Student book work:** pupils read ‘1.5: Networks’ and work through the questions. • **Computer work:** pupils work through the Activities in the student book. • **Plenary:** use AiFL techniques to assess understanding of key concepts and evaluate success criteria.

Lesson	Learning intentions	Experiences and outcomes	Key concepts	Teaching notes
3.5 Parallel processes: bat in a cave	In this lesson, learners will: • understand how parallel processes communicate in the code of a game. • use different backdrops and broadcast blocks to include multiple levels in a game.	**TCH 3-01a** **TCH 3-14a** **TCH 3-15a** **TCH 4-15a** **MNU 3-03a** **MNU 3-04a**	Parallel processes The 'broadcast' block Backdrop creation	This lesson covers student book pages 40–41. Suggested lesson structure: • **State** the learning intentions, displaying them visibly. • **Co-create** success criteria with pupils. • **Explain** the concept of parallel processes. Use one or more examples (e.g. on a video call, the system must process input from a camera simultaneously with input from a microphone, while also responding to any mouse or keyboard commands and processing output of sound and video). • **Cooperative learning discussion:** pupils could brainstorm with partners to come up with ideas of where they may have seen parallel processes that do or don't communicate with each other, then feedback to the class. • **Remind** pupils of parallel processes in previous Scratch games, such as the enemy and the player sprites both moving at the same time. • **Demonstrate** how to draw backdrops in Scratch. • **Demonstrate** use of a 'level' variable, broadcast and 'go to' block to change the backdrop whenever a sprite reaches the right edge of the screen. • **Student book work:** pupils read '3.5 Parallel processes: bat in a cave' and work through the questions. • **Computer work:** pupils may need to complete the Racemania program before the game in this lesson. • **Extension:** if any pupils finish the Activities, they could complete the 'Extension' Activities stated in the student book. • **Plenary:** use AiFL techniques to assess understanding of the key concepts and evaluate success criteria. An additional catch-up lesson may be required to allow pupils time to complete the racing and cave games.

Lesson	Learning intentions	Experiences and outcomes	Key concepts	Teaching notes
3.6 Parameters: the random number function	In this lesson, learners will understand: • how parameters are needed to code a function. • how to use the random number function.	**TCH 3-01a** **TCH 3-14a** **TCH 3-15a** **TCH 4-15a** **MNU 3-03a** **MNU 3-04a**	Functions Parameters	This lesson covers student book pages 42–43. Suggested lesson structure: • **State** the learning intentions, displaying them visibly. • **Co-create** success criteria with pupils. • **Explain** functions and parameters. • **Demonstrate** making Sprites disappear when touched by the player, scoring a point, using the random number function to make sprites appear at a random place and ending a program when a timer runs out. • **Student book work:** pupils read '3.6 Parameters: the random number function' and work through the questions. • **Computer work:** pupils are to create the game in the Activity. • **Extension:** if any pupils finish the Activities, they could complete the 'Extension' Activities stated in the student book. • **Plenary:** use AiFL techniques to assess understanding of the key concepts and evaluate success criteria.

1 Computer systems: Worksheet 1

1 mark for each question except where indicated.

Computers store all data as combinations of 1s and 0s.

1 What is the name of the 8-bit code used to store characters of text in computer systems?

2 Complete the sentence:

'Vector graphic storage stores _____ and attributes as text.'

3 What is a pixel?

4 Image A has a resolution of 100x100. Image B has a resolution of 1000x1000.

a) How many pixels are in Image A?

b) Which of the two images is better quality?

c) Which of the two images will take up more storage space? **3 marks**

5 What is the name for storing graphics by storing a colour code for every pixel?

6 Convert 11000100 from binary into denary.

7 Which component of the computer is used to hold currently running programs and data?

8 A CPU with four cores is called quad core. Why is it good for a computer to have a CPU with four cores?

1 Computer systems: Assessment

Name: _____ __ /24

1 mark for each question except where indicated.

1 Sean is using his laptop to create an educational website to teach people about how computers store data. He will include web pages on numbers, text, graphics, sound and video data.

a) Sean needs an example of binary conversion on his website. Convert 01101110 to denary.

b) The text on Sean's home page has 2048 characters.

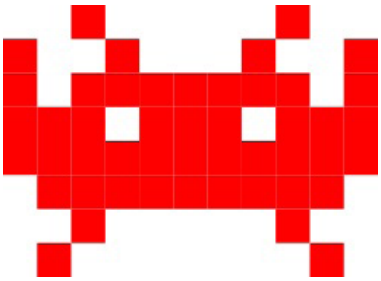
i) How much storage space is needed for one character of text?

ii) What name is given to the storage of characters which assigns each character a unique code made up of 1s and 0s?

c) Sean's page on graphics needs a description of the bit-mapped method of graphics storage.

i) Describe bit-mapped graphics storage. **2 marks**

Sean includes a basic bit-mapped graphic as shown.



ii) How many pixels are in this image?

d) Sean is worried that his laptop doesn't have enough RAM to edit videos.

i) What is RAM used to store?

ii) What is the name for a collection of lines that carries data between the CPU and RAM?

e) The CPU cores in Sean's laptop have three main parts.

i) Why is it good for a computer to have more than one CPU core?

ii) Match each part of the CPU core with the correct description **2 marks**:

Control unit	Performs calculations and makes decisions
Arithmetic and logic unit	Storage for data within the CPU core
Registers	Works out what program instructions require

f) Sean stores all the files for the website on flash storage. Name a backing storage device that uses flash storage.

g) Sean is going to record a short video explanation for one part of the website. State two input devices that Sean would require to do this. **2 marks**

2 Maja works for an independent company that sells home security systems. Maja has joined all the devices in her company's office to a network.

a) What name is given to a network that is only across one building?

b) Most of the devices are connected using wireless transmission media.

i) State the name of one wireless method of connecting devices.

ii) Describe a disadvantage of using a wireless connection instead of a wired connection.

c) Each computer in the office has a browser installed. What is a browser? **2 marks**

d) Maja has been given plans to a customer's house on paper. She wants to transfer the contents of the paper onto a computer in the office. What input device does Maja need to do this?

e) One of the workers in the office has difficulty with the movement of their arms and hands. However, this employee has no problems operating the computer. State two ways that someone with difficulty in the movement of their arms and hands can provide input to a computer system. **2 marks**

f) The home security systems often respond automatically to input from their surroundings. Which input device helps a security system know if an intruder has opened a door?

g) Maja has been sent plans to a building saved in a vector graphics format. Describe the vector method of graphics storage.