

Lacock School C of E Primary School

Medium Term Planning for Computing - Beech Class Spring Term 2 2022-2023

Topic / key question	Data and information – Data logging			
Lesson 1	Learning Intent: To explain that data gathered over time can be used to answer questions	Learning ladder success criteria: <ul style="list-style-type: none">I can choose a data set to answer a given question.I can suggest questions that can be answered using a given data set.I can identify data that can be gathered over time.	Starter Data around us <ul style="list-style-type: none">Introduce the lesson objectives (slide 2) and display the 'Data around us' slide (slide 3). The slide shows class registration data in a table. Ask the learners if they recognise what the data might be. Display slide 4 and use the questions on the slide to guide a short class discussion. The discussion should include: Data shown: present, absent, reasons for absence Data collection: data is collected every morning and afternoon when school is openFrom the data it's possible to identify who is in school and who is absent. It's possible to see if the absence was unauthorised. It can also show when someone is late.Review the slide and highlight to the learners that registration data is collected over time, and that this unit of work will focus on that idea. Main teaching activity Activity 1 – Data tables <p>Display slide 5. Talk through the tables in general terms and discuss the data that they show:</p> <ul style="list-style-type: none">Table A is data recorded about the weatherTable B is data that has been recorded using a fitness trackerTable C is data from a sport <p>Tell the learners that they will be looking at these data tables and deciding which table would be best used to answer some given questions. Talk through the example shown on the slide: "Which table would you look at to find the warmest day?"</p> <p>The question should be answered with A, B, or C. Highlight that we aren't looking for a specific day; this activity is looking at how data can be organised under headings. Give learners the 'Which data?' activity sheet, and ask them to complete it. Highlight that some of the questions can't be answered by the tables shown. Answers will only</p>	Notes:

be A, B, C, or X.

After learners have completed the sheet, display slide 6. Discuss the two questions shown:

- Which table would you look at to find the warmest day?
- Would we still know, even if less information were visible?

Highlight the headings on the tables and tell learners that the headings provide a good indication of what can be found out from the table.

Activity 2 – classroom data

Display slide 7 and reflect back to the previous slide, which shows the headings only.

Ask learners to look at the table headings (temperature, sound, and light) and think about what those might mean if data related to them in the classroom could be recorded. Ask learners to talk with a partner and think of some questions that could be asked if classroom environment data were gathered. The questions will mainly start with 'what' or 'when'. Click to build the slide and show the example questions:

- What was the highest temperature?
- When was the room quietest?

Display slide 8 and read out the helpful words. Give learners time to discuss with a partner. Gather feedback from the class and record good examples of questions.

Note: Keep the list created in this activity to review and refine in Lesson 5, when learners will think of questions and then record classroom data to try to answer them.

Independent work (HA / MA /LA or consideration for differing year groups)

Activity 3 – Collecting data

- Display slide 9 and tell learners that they are now going to collect some data about vehicles. They will watch a one-minute video and each learner will watch for a specific thing, for example, red cars. Assign each learner one thing from the list to watch for. They should watch for just that thing and keep a tally of how many times they see it.
- Display slide 10 and ask learners what three vehicles can be seen. If the three cars match the colour that learners are watching for, they can start their tally. Before you click on 'Play', explain that some car colours are harder to see than others, and that they should record them as they see fit; for example, dark silver may be seen as silver or black. Play the video and ask learners to record their tally. When the video has finished, give them time to total their tally.
- Display slide 11 and tell learners that you don't want to know their totals yet; that will be reviewed in the next slide. Read through the questions on the slide and ask learners whether the questions can be answered using the data they've just recorded. As you read each question, ask for a response from the class, then click to reveal the answer. Some questions can't be answered. Ask learners why some questions can't be answered. Draw out that they didn't collect the data to answer those questions, because they weren't told to. Highlight that it's important for people to think carefully about the questions that they want answers to before they collect data. The learners couldn't do

			<p>this because they were told what data to collect; they didn't make a choice. In later lessons, learners will choose the data that they collect.</p> <ul style="list-style-type: none"> • Display slide 12 and ask learners to share and compare their totals with the number recorded on the slide. It is likely that learners will have different answers to those shown. Ask why there is a difference. Answers may include: <ul style="list-style-type: none"> • People may have different ideas of which colour is which • Are all the vehicles shown at the end counted? • Learners only did this once and may have miscounted, as the cars move quickly • Some vehicles may have been counted twice accidentally • Ask learners for suggestions for ways to improve data collection, such as: <ul style="list-style-type: none"> • Agree which colour is which • Play the video more slowly • Record the video from a different angle <p>Activity 4 – Data gathered over time: people</p> <p>Display slide 13. Talk to the learners about the census. Highlight that the census is a way for the government to collect data about everyone in the country. It's carried out every ten years and data is recorded on:</p> <ul style="list-style-type: none"> • Who lives with you? • What are their ages? • Are they employed? • What are their qualifications? • What is their religion? <p>The data is collected by each household answering questions on a form. During this lesson, the learners have looked at different sorts of data that can be collected over time. Ask them whether they can think of any other data that might be collected over time. Briefly gather any ideas they have.</p> <ul style="list-style-type: none"> • Display slide 14 and provide learners with the 'Data that is collected regularly' activity sheet. Ask them to look at the images, showing health, sport, and environment and weather. Ask them to write down ideas for data that might be gathered, and to write down when or how often that data is collected. Some suggestions are given on slide 15. <p>To conclude the activity, ask learners to suggest ways in which data gathered over time might be useful (slide 16). Ideas may include:</p> <ul style="list-style-type: none"> • It can show whether or not we're getting enough exercise • It can show which team is doing the best, is winning, or has won <p>Plenary</p> <p>The plenary draws out the risks of drawing conclusions from small amounts of data.</p>	
Lesson 2	Learning Intent:	Learning ladder success criteria:	<p>Starter Sensing</p> <ul style="list-style-type: none"> • Display slide 2 and introduce the lesson objectives. 	Notes:

To use a digital device to collect data automatically.

- I can explain what data can be collected using sensors.
- I can use data from a sensor to answer given questions.
- I can identify that data from sensors can be recorded.

- Display slide 3 and ask learners to think about how we, humans, sense things. Ask what our senses are. Click to show images of the five senses.
- Show slide 4. Tell learners that computers can have input devices called sensors. Ask them if they can think of a way in which a computer could sense sound. Click to show the microphone. A microphone can be used as a sensor if it's connected to a computer.
- Display slide 5. Explain that personal computers often have microphones, but they aren't always easy to see. Microphones might be used to record sounds, or to capture a voice for a video call. A microphone can be used by a computer to detect how loud or quiet a room is. It could record the sound level in a room as data.

Main teaching activity

Activity 1 – data loggers

- Display slide 6 and read through the text. Ask learners to look at the image to see if they can draw any conclusions from what they see. The data logger display has readings and symbols around the edge. The light sensor can also be seen, and is marked with an icon.
- Display slide 7 (which builds) and identify where a sensor is located and where the reading from that sensor is displayed. Remind learners that each sensor is an input. Give them the 'Input Output' activity sheet to complete, using the slide for support.

Activity 2 – recording data

- Give out the 'Classroom data' activity sheet. Tell learners that they will be taking light, temperature, and sound readings from around the room. The highest/lowest reading column will be completed after all the readings have been taken.
- Display slide 8. Show learners how to switch the data loggers on and remind them what each reading on the display shows. Ask them to select six locations around the classroom. Tell them that they need to go to each location and take readings. Tell them to wait approximately 30 to 60 seconds before taking readings, because the temperature sensor can take time to register change. Give learners time to collect readings from around the room.
- After they have taken all the readings, ask them to look at their sheet to find the highest and lowest reading from each sensor and then to complete the highest/lowest column (slide 9).

Independent work (HA / MA /LA)

Activity 3 – recording data automatically

- Display slide 10. Tell learners that they have used the data logger and recorded data by hand. The data logger can also collect data automatically and record it. The image shows the graph that is created as data is automatically

			<p>collected.</p> <ul style="list-style-type: none"> • Show learners how to connect the data logger to a computer and how to open the data logger program (slide 11). The program will initially display live readings. Show learners how to start and stop recording in the data logger program (slide 12). Allow them to spend time recording data with the data loggers. Moving a hand over the light sensor will cause an obvious change to the data gathered. When learners have stopped a recording, ask learners to look at the graph created and reflect on what they can see (slide 13). • Note: Learners should only record data for a short period of time (around 15 to 60 seconds) in this activity. <p>Plenary</p> <p>Ask learners to think, pair, share to think of reasons why automatic data collection could be helpful or useful. Reasons may include:</p> <ul style="list-style-type: none"> • It's accurate if data needs to be collected at a set time, which is hard to do manually • It can be unattended; someone doesn't need to sit there all night and day • It's always gathered in the same manner, with no human error such as being in a different place or not using a sensor in the same way every time 	
<h2>Lesson 3</h2>	<p>Learning Intent:</p> <p>To explain that a data logger collects 'data points' from sensors over time.</p>	<p>Learning ladder success criteria:</p> <ul style="list-style-type: none"> • I can identify a suitable place to collect data. • I can identify the intervals used to collect data. • I can talk about the data that I have captured. 	<p>Starter</p> <p>Automatic data collection</p> <ul style="list-style-type: none"> • Display slide 2 and introduce the lesson objectives. • Display slide 3. Tell learners that data loggers can collect data independently from a computer. Data that is collected can be downloaded later. Explain that in this activity, learners will set the data loggers to collect data, then, later in the lesson, the data loggers will be connected to a computer and the data will be downloaded. Give learners time to choose a location to place their data logger and set it to start recording data (slide 4). • Note: When 'Start' is pressed on the data logger, a message will appear saying "Logging started". A small triangle will appear on the display under the word "Logging". <p>Main teaching activity</p> <p>Activity 1 – Data log</p> <ul style="list-style-type: none"> • Show slide 5 and explain to learners that they are going to be data loggers. The animation on the slide shows the sun rising and setting. As the sun rises and sets, the temperature changes. • Display slide 6 and hand out the 'Temperature log' activity sheet. Explain to learners that they are going to watch a short clip, and as they watch the clip, they need to watch the time and temperature changes. Tell learners that they should record the temperature on their log sheet for every hour shown in the simulation. Tell them that they will also hear a beep in the video as the hour 	<p>Notes:</p>

changes.

- Display slide 7. Ensure that the volume is turned up on the display computer. Press 'Play' to start the video, then immediately press 'Pause'. Show learners the time, and highlight the purple arrow under the temperature. Ask learners to record the temperature (12) on their sheet. Tell learners that they now need to watch and listen as the video plays, and record the temperatures. Play the video and allow learners to record the temperatures.
- **Scaffolded task:** Learners can work in pairs, with one learner describing what is on the screen and the other learner completing the temperature log.
- Once learners have finished logging the temperatures, ask learners to comment on the task (slide 8). Did they find it easy or hard? If they were recording temperature, sound, and light, do they think they could manage? Tell learners that the data logger can record temperature, light, and sound 50 times a second, and ask them if they think they could manage that.
- Display slide 9 and let learners check their own logging accuracy. Click to build the slide and show the graph of the data. Tell learners that the data logging software is recording data and plotting it at the same time.
- Display slide 10. Ask learners to look at the image on the slide and see if they can identify the logging interval. Click to display slide 11 and point out where the logging interval can be seen. Point out to learners that the interval might be different in a different experiment, e.g. if data is being logged for a week, the interval might be every hour.
- Show slide 12. Tell learners that each of the numbers that they recorded on their sheet is a data point. Data points can be plotted on a graph and joined up to produce a line graph. Click the slide to highlight the data points in the line graph shown.

Independent work (HA / MA /LA)

Activity 2 – Downloading data from the data logger

Display slide 13. Explain to learners that they are going to download the data that their data logger has been collecting since the start of the lesson. Ask learners to think about light, temperature, and sound data that will have been collected (slide 14). Ask learners to think, pair, share to answer the following questions:

- Which data do you think will show the most changes?
- Which data do you think will show the fewest changes?

Allow learners to explain their thoughts.

- Display slide 15. Explain the steps to connect the data logger to the computer, open the software, and download the data.
- Allow learners time to look at the graphs of their logged data (slide 16).
- Show slide 17 and explain to learners that they can view the data points in

			<p>their collected data. Remind learners that these data points are the equivalent of the readings that they took whilst watching the sunrise video.</p> <p>Plenary</p> <p>Display slide 18 and link the activities in this lesson with those of Lesson 2. Remind learners that the sensors are inputs used by the computer to gather data. The data is collected at regular intervals by a data logger. Each moment that data is captured can be seen as a data point. Connecting those data points helps to visualise data collected over time.</p>	
<p>Lesson 4</p>	<p>Learning Intent:</p> <p>To recognise how a computer can help us analyse data</p>	<p>Learning ladder success criteria:</p> <ul style="list-style-type: none"> I can view data at different levels of detail. I can sort data to find information. I can explain that there are different ways to view data. 	<p>Starter</p> <p>Finding things out</p> <ul style="list-style-type: none"> Display slide 2 and introduce the lesson objectives. Display slide 3. Introduce the idea of data being saved so that it can be shared with other people. Explain that in this lesson, learners will be accessing and using data recorded from an experiment that was completed by someone else. <p>Main teaching activity</p> <p>Activity 1 – Importing data</p> <ul style="list-style-type: none"> Display slide 4 and outline the experiment described on the slide. The cup contained very hot water. A temperature probe (sensor) was connected to the data logger and placed in the water. The temperature of the water was recorded for five hours. Display slide 5 and ask learners to think about the experiment. Ask the questions on the slide and ask learners to discuss them with a partner. <p>What happens to hot things if they are left to stand? What might the data logger graph look like?</p> <ul style="list-style-type: none"> Learners should be aware that hot things will usually cool down if they are left. Learners may recognise that the temperature will become lower over time. Some learners may identify the downward-sloping graph as a representation of a value decreasing. Ask learners to open the data. After learners have opened the data, allow a few minutes for them to look at the graphs and think about which graph will show data relevant to the experiment (slide 6). Click through slides 7 and 8 to show learners how to change the data view in the software, and how to see more detail. Display slide 9 and hand out the ‘Cooling experiment’ activity sheet. Outline the questions, then allow learners time to use the software to find answers to the questions on the activity sheet. <p>Note: Learners may need help recognising the times that are just after the hour. The data points just after each hour are as follows:</p> <ul style="list-style-type: none"> 1 hour is at 60 min 35s 	<p>Notes:</p>

- 2 hours is at 120 min 19s
- 3 hours is at 180 min 3s
- 4 hours is at 240 min 38s
- 5 hours is at 300 min 22s

Activity 2 – finding information

- Display slide 10. Explain that this graph shows light measured over time using a data logger. Because light can fluctuate quickly and frequently, the graph shows a series of rapidly changing peaks and troughs. Explain that this could be caused by factors such as the artificial light level in the classroom, things obstructing the sensor, or external factors such as the sun going in or out.
- Display slide 11. Explain that this is a noise level graph. In this case, the sensor has been placed in a usually quiet place, but with a couple of spikes where a loud noise has been sensed. Explain that if the sensor was in a noisier room, the graph would be more uneven.
- Display slide 12. Highlight the graph that shows light data. Tell learners that they are going to use all the skills that they have just learnt to look at the light data recorded in the same cooling experiment. Provide learners with the 'Light levels' activity sheet.

Independent work (HA / MA /LA)

Activity 3 – Viewing data

- Display slide 13 and explain to learners that the data collected using the data logger can be exported and viewed in other software. The upper image on the slide shows the table view in the data logger software. The lower image shows the same data in a spreadsheet.
- Display slide 14. Explain that the data from the cooling experiment has been exported already, and can be viewed in a spreadsheet. Ask learners to open the link shown on the slide in a web browser. This will open a Google Sheets spreadsheet that contains the data. Ask learners to follow the instructions on the slide to sort the data using a filter. The data can be sorted from smallest to largest (A–Z) or from largest to smallest (Z–A). Doing this will allow the highest and lowest values in the data to be identified quickly. Ask learners to find the highest and lowest readings for temperature, light, and sound.

Plenary

Finding information

Remind learners that during this lesson, they have used graphed data and tabular data to find answers. Ask learners what difference they think using a computer makes to this process, for example:

- Sorting the table allows the highest and lowest values to be found quickly
- Seeing change over time or finding a reading for a set time is easier using the graph

Lesson 5

Learning Intent:

To identify that data needed to answer questions.

Learning ladder success criteria:

- I can propose a questions that can be answered using logged data.
- I can plan how to collect data using a data logger.
- I can use a data logger to collect data.

Starter

Collecting data to answer questions

- Display slide 2 and introduce the lesson objectives.
- Display slide 3 and talk about data collection. Discuss who collects data and why that data is collected, e.g. the class register is data collected by the school so that they know who is in school. Ask learners to think, pair, share to discuss data that might be gathered and why. Use the idea of a step counter to start the discussion. Learners may identify that the wearer wants to be fitter or healthier, etc.

Main teaching activity

Activity 1 – Asking questions

- Display slide 4 and tell learners that in this lesson, they will think of their own questions, and then later, they will use a data logger to help find answers — the data loggers will be used at some point between this lesson and the next lesson. Remind learners that the data loggers can collect light, temperature, and sound data. Tell learners that they will spend a few minutes thinking of two questions, which they will then share with the class.
- Display slide 5. Show learners the words on the slide and discuss the two example questions. Provide learners with the ‘Thinking of questions’ activity sheet and allow time for learners to write questions.
- After 10 minutes, bring learners back together and ask for question suggestions. Discuss the questions suggested with the class and write a list of potential questions.

Activity 2 - Data collection plan

Note: Learners can work in groups of two or three to plan and collect data.

Display slide 6. Tell learners that they now need to plan their data logging activity. Ask learners to select a question from the class list (or a question that you have approved). Discuss the questions and considerations shown on the slide:

- “I’m going to collect data to answer this question:” — learners should select a question from the class list, or another question that they have agreed with you.
- “Where does the data logger need to be placed? How does the data logger need to be set up?” — learners should identify where the data logger will be placed and whether it needs to be orientated in a particular direction, e.g. a light sensor facing towards the window. If learners wish to use an external temperature probe, they should include that.
- “When will data collection start? When will data collection stop? How long will data be collected for?” — learners should identify the time frame of their data collecting, e.g. 24 hours, overnight, until X...
- “I think the data that I collect will show...” — learners should predict what their data will show and add their hypothesis.

Notes:

			<p>Note: The data loggers can be manually started and stopped using the buttons on the device. Some management of devices and time will be required to allow learners to collect data at their chosen times. The loggers could also be connected to a computer and logging could be started and stopped from within the logging software. It is recommended that you suggest a common start/end time to all learners to help manage the data collection process effectively.</p> <ul style="list-style-type: none"> • Display slide 7 and provide learners with the ‘Data collection plan’ activity sheet. Ask them to complete it. <p>Independent work (HA / MA /LA)</p> <p>Activity 3 – Testing time</p> <ul style="list-style-type: none"> • Allow learners time to test the data logger setup in accordance with their plan. Ask them to collect data for a minute or two, and to check that the data that they collect aligns with their expectations. • Show slide 9 and explain to learners that they will collect their data between now and the next lesson. <p>Plenary – Does the computer know what it is?</p> <ul style="list-style-type: none"> • Display the question on slide 10. Ask learners to indicate which response they think is correct for the statement “I want to know at what time the classroom is at its brightest.” Click to reveal that the light sensor is the correct response. • Display the question on slide 11. Ask learners to indicate which response they think is correct for the statement “I want to know where I should place the school bell.” Click to reveal that the noise sensor is the correct response. • Display the question on slide 12. Ask learners to indicate which response they think is correct for the statement “I want to know when I should turn the heating on.” Click to reveal that the temperature sensor is the correct response. 	
<p>Lesson 6</p>	<p>Learning Intent:</p> <p>To use data from sensors to answer questions.</p>	<p>Learning ladder success criteria:</p> <ul style="list-style-type: none"> • I can interpret data that has been collected using a data logger. • I can draw conclusions from the data that I have collected. 	<p>Starter</p> <p>Analysing and drawing conclusions</p> <ul style="list-style-type: none"> • Display slide 2 and introduce the lesson objectives. • Display slide 3. Remind learners that in Lesson 5, they chose a question to answer by collecting data. They have collected data and now need to analyse it. Talk to learners about the word ‘analyse’ and tell them that they are going to look at (analyse) the data that they have collected. The learners’ key task is to answer their chosen question, but they should also carefully look at their data to see if they can draw any other conclusions. <p>Main teaching activity</p> <p>Activity 1 – Review your collected data</p> <ul style="list-style-type: none"> • Display slide 4. Tell learners that they are going to analyse the data that they have gathered since the previous lesson, using the data loggers. learners may need to download the data from the logger, or load it from a central location if 	<p>Notes:</p>

- I can explain the benefits of using a data logger.

it has been downloaded for them.

- Explain that once learners can see their logged data, they should check that the data looks as they expect, e.g. ensure that it is their data, not someone else's.

Note: You may need to remind learners how to download their data file from the logger. If the data has already been downloaded, remind learners how to access their file.

Ask learners to spend a few minutes looking at their data using the logger software.

Use slide 6 to remind learners how to hide data that isn't relevant. The slide also shows how to zoom in and look at a specific area of data.

- Learners should use the tools in the data logging software to review the data that they have collected. Display slide 7 to show learners how to identify a specific data point in the graph. The example shown on the slide is temperature data logged over 21 hours. The image shows that moving the mouse cursor over the lowest part of the graph makes the information from particular data point appear.

Independent work (HA / MA /LA)

Activity 2 – writing a report

- Show learners the example report on slide 8. Then, hand out the 'Data collection report' activity sheet and tell learners to complete their own report. In their report, they will include their question, which they decided during the previous lesson, what they thought would happen, how they set the data logger up, and what they found out.
- **Note:** Learners should focus on the data that can be used to answer their question. Some learners will identify more information from the logging and should include that in their report.

Plenary

Benefits of using a data logger

Ask learners to think, pair, share to reflect on their experiment and consider how using a data logger has been beneficial. Learners should also consider what they would have done if they didn't have a data logger. The discussion may include:

- Data is collected automatically
- Data can be collected without you needing to be there
- Data collection should be consistent, as the logger is in the same place collecting the same data in the same way
- A data logger may capture something unexpected, whereas collecting data manually would tend to be very focused