



## Unit 7.5 Data: designing structure, capturing and presenting data

### About this Unit:

In this unit pupils will consider how to collect relevant data to answer a question. They will design a file to handle the data and will check their entries for accuracy. Finally, they will use the database functions in a spreadsheet package, such as Microsoft Excel, to interrogate their data and consider the plausibility of the conclusions they have drawn.

The lessons are designed for pupils working at levels 4 and 5, with extension work for pupils working at higher levels. Adaptations and extra material are suggested for less experienced pupils or for pupils working at lower levels.

### Where this Unit fits in:

Use the knowledge, skills and understanding set out in the 'Reviewing, modifying and evaluating work as it progresses' section of the Key Stage 2 programme of study for ICT, including:

- reviewing what they have done to help them develop their ideas;
- talking about what they might change in future work.

### Expectations

#### At the end of this unit

**most pupils will:** consider an appropriate hypothesis for the analysis of their collected data; analyse the data and prepare reports using appropriate display methods, *e.g. graphs* and appraise the original hypothesis; check data for accuracy and select appropriate information for the production of the report

**some pupils will not have made so much progress and will:** design questionnaires to collect data; construct a database to contain the data; enter data into the file and check it for accurate entry; analyse the data and display results, *e.g. graphs*; discuss the validity of the results they obtain

**some pupils will have progressed further and will:** form hypotheses as a result of further research, *e.g. web-based study*; use complex searching to test hypotheses; have a clear sense of audience in presenting the outcomes of their work in their report.

### Vocabulary and Resources

Through the activities in this unit pupils will be able to understand, use and spell correctly vocabulary relating to:

- data collection, *e.g. questionnaire, validation, verification*
- databases, *e.g. field, record*

Speaking and listening - through the activities pupils could:

- ask questions to gain clarification and further information.



Learning Objectives <i>Pupils should learn...</i>	Possible Activities	Learning Outcomes <i>Pupils can...</i>	Consider
<p><b>Activity 1</b></p> <ul style="list-style-type: none"> <li>to design questionnaires which record numerical data, text and choices</li> <li>to ask questions in order to gain clarification and further information</li> </ul>	<ul style="list-style-type: none"> <li>Explain to the pupils that they are going to do some research to support a lottery bid for funding a new leisure/sports amenity in their local area. The objective will be to present their findings in a report, ensuring that the bidding is appropriate to the needs and wishes of the local community. This will involve finding out information, <i>eg what facilities the local people would like in such an amenity.</i></li> <li>Reinforce concepts of fields, records and data types and demonstrate a prepared database to revise these.</li> <li>Introduce a topic and discuss the information the class would like to be able to find from a database, <i>eg gender, age, sporting and hobby activities, wish list of activities, opening hours.</i></li> <li>Discuss a couple of questionnaires to evaluate, <i>eg question types, layout, field types.</i></li> </ul>	<ul style="list-style-type: none"> <li>evaluate a range of questionnaire designs, highlighting advantages of specific questions</li> <li>recognise fields, records and data types from a questionnaire layout and a database</li> </ul>	<ul style="list-style-type: none"> <li>This can include links to other subjects, links to other activities, class management, health and safety.</li> <li>Many different types of information could be collected, <i>eg costs, distance to amenity.</i> The actual facility being planned could be any suitable project, <i>eg a youth centre.</i> Pupils should be aware that they do not need to collect people's names and therefore this activity falls outside the data protection legislation.</li> <li>Homework could involve pupils comparing sample questionnaires and designing a possible layout for use in this activity.</li> </ul>



Learning Objectives <i>Pupils should learn...</i>	Possible Activities	Learning Outcomes <i>Pupils can...</i>	Consider
<p><b>Activity 2</b></p> <ul style="list-style-type: none"> <li>• that getting information successfully from a database depends crucially on collecting appropriate data</li> <li>• to design a questionnaire that elicits the correct information</li> <li>• to set up an appropriate database structure that enables successful queries</li> </ul>	<ul style="list-style-type: none"> <li>• Ask the class to discuss, in groups, what data they are going to collect in order to produce a report informing the bidders about the most appropriate facilities. They should form a hypothesis at this point related to their own opinions, <i>eg expecting swimming to be the most popular choice or girls to dislike football</i>. Explain to the pupils how to ask questions to gain clarification and further information. They need to agree as a class what data to collect and its format. Ask the pupils to construct questionnaires to collect data. Ask them to construct the database to enable data entry of the collected data. Ensure pupils understand the sorts of questions they need to ask from the data before the structure is finalised.</li> </ul>	<ul style="list-style-type: none"> <li>• ask questions using appropriate terminology</li> <li>• design a questionnaire which matches the structure of the database</li> <li>• design and set up a database structure</li> </ul>	<ul style="list-style-type: none"> <li>• Homework could involve pupils collecting data, but they should not collect more than 10 questionnaires. Pupils should only enter data for their own benefit to demonstrate test validation and verification techniques. It is essential that all the files have the same structure so that they can be merged to give a comprehensive number of records for pupils to search.</li> <li>• It would be appropriate to demonstrate merging files to students and the use of such file types as CSV (comma separated variable) to import and export data for this purpose.</li> </ul>



Learning Objectives <i>Pupils should learn...</i>	Possible Activities	Learning Outcomes <i>Pupils can...</i>	Consider
<b>Activity 3</b>			
<ul style="list-style-type: none"> <li>to enter data into prepared structures</li> <li>to check the accuracy of the data as it is entered and to use verification techniques provided by the software</li> </ul>	<ul style="list-style-type: none"> <li>Ask pupils to enter data into the database from the completed questionnaires. During this process explain to pupils how to verify the accuracy of the data and how to use techniques offered by the software to alert operators to incorrect entry.</li> </ul>	<ul style="list-style-type: none"> <li>enter data into prepared structures</li> <li>check the accuracy of the data as it is entered, using verification techniques provided by the software</li> </ul>	<ul style="list-style-type: none"> <li>Data files will need to be merged before the next activity.</li> </ul>
<b>Activity 4</b>			
<ul style="list-style-type: none"> <li>to add extra fields to a database</li> <li>to search a database using simple and complex queries</li> <li>to produce graphs</li> </ul>	<ul style="list-style-type: none"> <li>Show pupils how to add an extra field to the database that was not considered earlier but would provide useful information, <i>e.g. opinions on local facilities already provided</i>. Discuss why this late addition would prove costly to research and add at this stage.</li> <li>Revise searching and graphing using the merged database, ensuring that pupils are saving the results that they need for their report. This activity should be related to the hypotheses formed earlier.</li> </ul>	<ul style="list-style-type: none"> <li>add an extra appropriate field</li> <li>search the database and produce graphs as required</li> </ul>	<ul style="list-style-type: none"> <li>Pupils do not need to add the extra data but should understand the need and how to be able to do so.</li> </ul>
<ul style="list-style-type: none"> <li>to combine information to produce a report appropriate to the audience</li> </ul>	<ul style="list-style-type: none"> <li>Discuss with pupils the audience for the report and the conclusions that might be drawn from the research. Ask pupils to produce individual reports. Ensure pupils present the data in forms that show the information needed, appropriately combining numerical, graphical and text information. Discuss appropriate software.</li> </ul>	<ul style="list-style-type: none"> <li>produce a report, combining information appropriate for the conclusion and the audience</li> </ul>	<ul style="list-style-type: none"> <li>Homework could involve pupils drafting the content of the report and considering the conclusions that might be drawn.</li> </ul>

*These units have been adapted from material available on the QCA Schemes of Work website*