

Unit 5 Data: designing structure, capturing and presenting data

About the unit

In this unit pupils consider the information that they need in order to collect appropriate data to test a hypothesis. They do this through the scenario of a lottery bid for funding to build new sports facilities on the school site. They collect data using questionnaires, design a structure to contain the data and enter it into a file. Using this data, they analyse results and draw conclusions. During the process they learn how to add fields to the database and consider data-validation techniques that might be used to check the data for accuracy. Once all data has been collated they use the results to produce a report to support the lottery bid.

This unit is expected to take 6 hours.

Where the unit fits in

This unit builds on the work carried out in the key stage 2 scheme of work, particularly unit 3C 'Introduction to databases', unit 4D 'Collecting and presenting information: questionnaires and pie charts' and unit 5C 'Evaluating information, checking accuracy and questioning plausibility'.

This unit provides a basis for progression on the use and collection of data in unit 10 'Information: reliability, validity, bias', unit 11 'Data: use and misuse', unit 13 'Control systems' and unit 14 'Global communication: negotiating and transferring data'.

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, *eg 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, *eg 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, *eg 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

Prior learning

It is helpful if pupils have entered data into a flat-file database and searched a database using straightforward lines of enquiry.

Extension and enrichment

Pupils could:

- collect data for their survey outside the school, but limits should be put on the number of questionnaire responses that they enter into the final database
- study other questionnaires and discuss the objectives and types of data being collected
- combine similar data from another school to enhance this activity

Language for learning

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

- data collection, *eg questionnaire, validation, verification*
- databases, *eg field, record*

Speaking and listening – through the activities pupils could:

- ask questions to gain clarification and further information

Resources

Resources include data-handling software that allows data from a number of files to be merged to form one file.

Learning objectives

Pupils should learn:

Possible teaching activities**Learning outcomes**

Pupils:

Points to note**Activity 1**

- to design questionnaires which record numerical data, text and choices
- to ask questions in order to gain clarification and further information
- 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, *eg what facilities the local people would like in such an amenity.*
- Reinforce concepts of fields, records and data types and demonstrate a prepared database to revise these.
- Introduce a topic and discuss the information the class would like to be able to find from a database, *eg gender, age, sporting and hobby activities, wish list of activities, opening hours.*
- Discuss a couple of questionnaires to evaluate, *eg question types, layout, field types.*
- evaluate a range of questionnaire designs, highlighting advantages of specific questions
- recognise fields, records and data types from a questionnaire layout and a database
- This can include links to other subjects, links to other activities, class management, health and safety.
- Many different types of information could be collected, *eg costs, distance to amenity.* The actual facility being planned could be any suitable project, *eg a youth centre.* Pupils should be aware that they do not need to collect people's names and therefore this activity falls outside the data protection legislation.
- Homework could involve pupils comparing sample questionnaires and designing a possible layout for use in this activity.

Activity 2

- that getting information successfully from a database depends crucially on collecting appropriate data
- to design a questionnaire that elicits the correct information
- to set up an appropriate database structure that enables successful queries
- 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, *eg expecting swimming to be the most popular choice or girls to dislike football.* 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.
- ask questions using appropriate terminology
- design a questionnaire which matches the structure of the database
- design and set up a database structure
- 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.
- 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.

Activity 3

- to enter data into prepared structures
- to check the accuracy of the data as it is entered and to use verification techniques provided by the software
- 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.
- enter data into prepared structures
- check the accuracy of the data as it is entered, using verification techniques provided by the software
- Data files will need to be merged before the next activity.

Learning objectives

Pupils should learn:

Possible teaching activities**Learning outcomes**

Pupils:

Points to note**Activity 4**

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| <ul style="list-style-type: none"> • to add extra fields to a database • to search a database using simple and complex queries • to produce graphs | <ul style="list-style-type: none"> • Show pupils how to add an extra field to the database that was not considered earlier but would provide useful information, <i>eg opinions on local facilities already provided</i>. Discuss why this late addition would prove costly to research and add at this stage. • 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. | <ul style="list-style-type: none"> • add an extra appropriate field • search the database and produce graphs as required | <ul style="list-style-type: none"> • Pupils do not need to add the extra data but should understand the need and how to be able to do so. |
| <ul style="list-style-type: none"> • to combine information to produce a report appropriate to the audience | <ul style="list-style-type: none"> • 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. | <ul style="list-style-type: none"> • produce a report, combining information appropriate for the conclusion and the audience | <ul style="list-style-type: none"> • Homework could involve pupils drafting the content of the report and considering the conclusions that might be drawn. |