

# Key Stage 3 National Strategy

## Handling data: key messages

This leaflet is for ICT teachers who were unable to attend the national training. It summarises the main points and is best used as part of a departmental meeting.

Other Key Stage 3 National Strategy materials can be found on the website at [www.standards.dfes.gov.uk/keystage3](http://www.standards.dfes.gov.uk/keystage3)

### 1 Organising and investigating data

Organising and investigating data involves pupils in a cycle of:

- posing a question or proposing a hypothesis;
- deciding what data they need to collect;
- collecting data;
- designing a data handling framework;
- entering data;
- checking data for errors or inconsistencies;
- interrogating data;
- transforming or presenting data differently;
- testing their hypotheses;
- coming to conclusions;
- posing new questions.

Progression across Key Stages 2 and 3 is crucial, since the basic data handling cycle is broadly the same in each key stage. Most pupils coming into Year 7 will have been through the data handling cycle at a basic level. Build on this by increasing the complexity and sophistication of the contexts for enquiries.

### Judging pupils' understanding of a set of data

**Construct a list of questions** for pupils to answer in relation to a set of data. This can help to identify what different pupils know, understand and can do. Remember that:

- **What?** questions often involve a literal level of thinking, since the answer can be seen explicitly.
- **How?** questions demand more inference and reading between the lines.
- **Why?** questions often require information to be collated from different sources as well as higher levels of reasoning.

### Tips for teaching and learning

- **Plan short starter activities** with a fast pace; for example, using sorting cards to help get a discussion going, or using Yes/No cards for responses to a series of statements. Expect everyone to join in.

- **Plan main activities** to include:
  - a range of organisational features (whole-group activity, whole-group discussion, paired activity, paired discussion);
  - a range of teaching strategies (presentation, summary, explanation, questioning, discussion);
  - a range of preferred learning styles (reading, looking, writing, drawing, listening, talking, thinking, practical ICT activity).
- **Plan plenaries** to revisit the objectives of the lesson and to summarise and make explicit what pupils have learned. Involve pupils in reflecting on the lesson and identifying what was important about it.

## 2 Graphical representation of data

Graphical representation occurs in ICT in:

- **Finding things out:**  
reading a graph, testing a hypothesis and drawing conclusions from frequency or scatter graphs;
- **Developing ideas and making things happen:**  
transforming, developing or displaying information in various ways to understand it better and communicate it more effectively to others;
- **Exchanging and sharing information:**  
considering fitness for purpose and reviewing, modifying and evaluating work as it progresses.

Data handling and graphical representation are key features of mathematics and science, as well as ICT. Good liaison with these departments is essential.

In ICT, the three issues to address in Key Stage 3 are:

- Can pupils use the software to create a graph or chart?
- Is the graph or chart appropriate for the data?
- Is the graph or chart 'fit for purpose'?

### Judging whether Year 7 pupils can create a graph

In Key Stages 1 and 2 pupils will have used a simple graphing package rather than full data handling or spreadsheet software. But creating a graph can mean little more than a click on a button! To find out if pupils can draw a graph, you need to take them through the whole process. First, check that they know the essential features of any graph:

- a title;
- labels on the axes;
- numbering of the scale(s);
- a key if there are two or more sets of data;
- an acknowledgement of the source of the data, where appropriate.

Next, find out if they can create a simple bar chart based on categorical data, such as their favourite drink. Introduce a second element, such as finding out whether boys and girls prefer different drinks.

### Tip for helping pupils to think about ‘fitness for purpose’

One way to help pupils to think about which graphs are fit for particular purposes is to get them to match a selection of graphs to different requirements. As they do this, they will need to keep three factors in mind:

- the purpose of the graph (including the nature of the data being used);
- its intended audience (including its likely readers and context);
- its style (including the type and format of the graph and any additional information shown).

## 3 Teaching data collection

Pupils may suggest their own ideas for investigations or you may suggest one; for example:

- **Year 7:** Do different types of newspapers use sentences and words of different lengths? If so, why?
- **Year 8:** Which packets of crisps offer the best value for money? Does this vary with flavour? To what extent can people detect the flavour of a crisp in a blind tasting?
- **Year 9:** How far can people jump from a standing start? To what extent does a run-up help? Does practice improve the distance jumped?

It is not necessarily ineffective to use a context that has been used before. What is important is that the Key Stage 3 lessons build on what pupils have learned previously. They should present the context in a different or more challenging way, approach it from a different perspective or with a different enquiry, or investigate the context in more detail.

Investigations may lead to further questions; for example:

- Year 8 pupils might investigate the time during a football match when a team is most likely to score a goal; this might lead to asking questions about different divisions in the football league or the likelihood of a spectator missing a goal if they leave 10 minutes early.
- An initial investigation into how much TV adults and children watch might lead to further questions about the factors that affect TV viewing habits, such as hours of work or sleep, weekly travelling distance, position of the televisions in the house, and so on.

Investigations may lead to a conclusion about relationships between variables; for example, that neck measurement is about twice wrist measurement, or that more road accidents occur when it is dark. This links to modelling with spreadsheets.

Pupils need to know which graphs are suitable for the current context and whether they represent the data accurately. Pie charts, for example, are only suitable for categoric data, and line graphs for continuous data. Frequencies are commonly represented on bar charts and bar-line graphs. The graphs generated from data handling software don't always represent data accurately.

Designing a questionnaire and a data handling structure go hand in hand. Pupils could begin with one or the other but will always need to go back and refine each as the other develops.

Pupils need to consider sample size and type (for example, who to ask, how many to ask, where and when the sample will be taken, since all these factors can affect the outcomes of their investigation). They need to recognise that too small a sample may give unrepresentative results and too large a sample may be expensive in resources and time.

They will also need to think about phrasing their questions precisely and unambiguously in order to get the required information. This takes a great deal of skill.

## 4 Planning to teach unit 7.5

Unit 7.5 focuses on the 'organising and investigating' objectives. Each of the six lessons in the unit is 'chunked' into a variety of different activities of different lengths. Each lesson also includes a range of strategies used by the teacher. When you first study the unit, think about:

- the range of time allocated to each part of the lesson (from 5 minutes to 25 minutes);
- the different pupil groupings (from individual to whole class);
- the teaching strategies used (from demonstration to discussion).

You might decide to allocate shorter or longer times for some activities than for others. There are good reasons for doing this.

- One or two changes in the pace of a lesson help pupils stay on-task and can make the lesson more enjoyable.
- Pupils need to spend longer on some activities (for example, those involving investigation or experimentation) if they are to learn from them.
- Some activities can bring about effective learning just as well in a short time as in a longer session.
- A lesson where pupils spend only 5 minutes on each new step of learning will not provide the necessary time for them to think about what they have learned, practise it and consolidate it.
- The overall time allocation for a teaching unit does not allow time for pupils to carry out sustained investigative activities at every step.