



## **WORKSHOP GUIDES FOR TEACHERS TO LEARN TOGETHER PRIMARY S1 PRACTICAL DATA HANDLING**

Guide for your own self-help professional development workshop  
and resources for inquiry based lessons.

### **MANAGE YOUR OWN PROFESSIONAL DEVELOPMENT WORKSHOP**

These guides are designed to support teachers in developing a deep understanding of the mathematics they are required to teach and in developing more effective ways of teaching.

You can use these guides on your own or as one of a group of teachers who meet together to talk about your mathematics lessons as part of your professional development. Maybe one of you will take the lead in organizing time, date and venue but once you are doing the activities together you will all participate on equal terms in the discussion and reflection.

### **EACH WORKSHOP GUIDE HAS A SIMILAR FORMAT:**

- |                        |  |
|------------------------|--|
| <b>PAGE 1</b>          | <b>TITLE PAGE</b><br>Teaching strategy.<br>Curriculum content and learning outcomes.<br>Summary of mathematical topic (FACT BOX.)  |
| <b>PAGES 2 &amp; 3</b> | <b>WORKSHOP ACTIVITIES FOR TEACHERS</b><br>Two pages for you to work through with your colleagues. These are activities to be shared and discussed. For each activity there is a list of resources needed, how to organise the activity (e.g. pairs, whole group) and about how long the activity will take. |
| <b>PAGES 4 &amp; 5</b> | <b>CLASSROOM ACTIVITIES FOR LEARNERS</b><br>Two pages to help you plan your lesson. You are advised how long to allow for the activity, the resources you might need and the key questions to ask.   |
| <b>PAGES 6 TO 10</b>   | <b>CHANGES IN MY CLASSROOM PRACTICE</b><br>Pages on implementing the teaching strategies with additional resources and activities for use during or after the workshop such as worksheets and templates.   |

# Practical Data Handling

## Teaching strategy: Learning through collaboration

**Curriculum content:** Data Handling

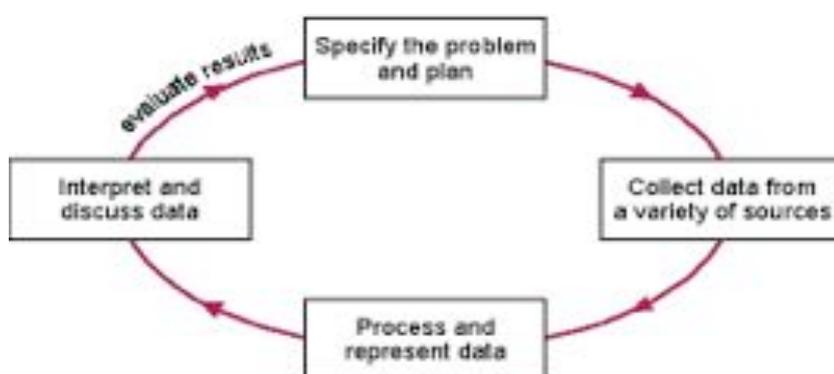
**Prior knowledge needed:** Learners should know how to measure lengths in centimetres and millimetres but these activities can also be used to learn how to read measurements and to practise reading scales.

**Intended Learning Outcomes** At the end of this activity teachers and learners will:

- Know the data handling cycle
- Understand that data can be represented in a number of ways
- Be able to construct a range of graphs from primary data and analyse outcomes using appropriate mathematical language
- Appreciate that data handling plays an important role in every-day life
- Have experienced the use of the data cycle to collect, present and interpret primary data

### Fact box

The data cycle is a helpful process for collecting, presenting and interpreting information in order to find out more about a problem.



We can collect data by designing a survey, which might include questionnaires or interviews.

We can analyse that data by working out important numerical statistics – the mode average, the median average and the mean average.

We can also represent the data that we collect as an image or graph using pictographs, bar graphs and pie graphs.

The **mean**

The **median**

The **mode**

**Qualitative data**

**Quantitative data**

### Resources

*String, tape measures, chalk, card, colouring pens, scissors*

## Workshop Activities for Teachers

### Activity 1: Constructing a human pie graph (shoe sizes)

*Chalk, string, card, koki pens, large outdoor/indoor area (e.g playground)*

Whole group

45 minutes

1. Each teacher to write their shoe size clearly on a card and then organise themselves in order of shoe size, lowest to highest (you could do this in the corridor and walk out in that order).

Note: It is important for teachers and your learners organise this for themselves.



2. Outside, stay in order and form a large circle. Two or three volunteers draw a circle using the string (about 2m long) and some chalk. If the area you are using is earth or soil, you could use a stick instead of chalk.

3. Stand around the edge of the circle **at an equal distance from each other**. Draw lines between each group of shoe sizes and use the chalk to design a pattern for the sector which you have created, marking a key clearly on or outside the circle (see photo below).



4. What sort of questions could you ask learners about the graph? Use the correct mathematical language.
5. Estimate the value, in degrees, of one member of the group ( $360 \div$  the number in the whole group)

#### Note

There is no need to attach the string to the chalk. Just make sure that the person in the centre is holding the string at a fixed point and that the string stays fully extended.

Make sure that teachers and learners **are at an equal distance from each other** around the edge of the circle.

## Activity 2: Data Detectives

**Resources:** Tape measures or strips of newspaper and rulers, koki pens, scissors; printed copies of the data cycle, data collection strips (shown below, one for each teacher)

Name	Shoe size	Foot length (cm)	Height (cm)	Eye colour	Number of people in household	Way of getting to school	Distance to school (km)	Journey time to school (minutes)

1. Discuss the questions:

‘What is data?’

‘Who asks for data in everyday life?’ (Advertisers; retailers; police; hospitals/doctors; teachers)

‘What are the most common day-to-day ways of collecting data?’ (surveys; questionnaires; interviews).

‘How is data usually displayed?’ (Pie graphs; lists; bar graphs; pictographs; line graphs; sentences/text/paragraph.)

Discuss these questions in pairs and report. **Write some responses on the board.**

2. Give out the data cycle and discuss the key words. Each teacher needs a copy of the data collection strip and a tape measure (or strips of newspaper and rulers)

Work in pairs or in groups to collect the data using the headings on the data sheet.

Assemble the A4 strips as a table/ group, and then move them about to make charts to show findings.

3. Play some games with the data, e.g, line the group up in height order with their heights written boldly on card to the nearest cm.

4. Stick the measurement cards (in order) on the board/outside wall.

5. Using the measurement cards, find the mode, median and range.

If time, choose another data set and repeat the process.

Discuss how you might organise this activity with your learners, depending on the resources available.

For example, if no tape measures are available, learners could:

- draw around their feet on paper and measure the length in cm
- draw around each other on newspaper.

## Classroom Activities for Learners

### Activity 1: The human pie graph

A length or ball of string; several pieces of chalk (different colours, if available)

Whole class

45 minutes

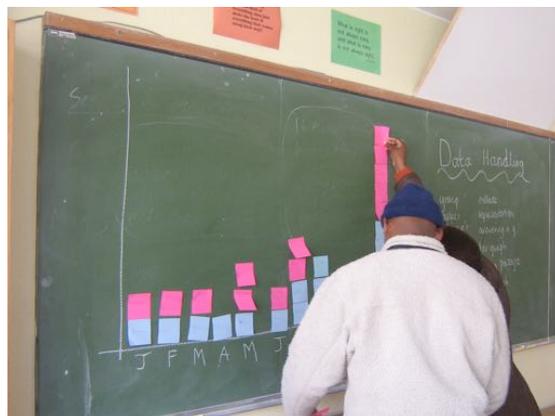
1. Ask each learner to write their shoe size clearly on a card. Ask them to organize themselves in order of shoe size, lowest to highest (you could do this in the classroom and ask them to walk out in that order). Note: It is important to let the group organise this for themselves.
  
2. Outside, ask learners to stay in their order and form a large circle. Ask for two or three volunteers to draw a circle using the string (about 2m long) and some chalk. If the area you are using is earth or soil, you could use a stick instead of chalk. Ask them to stand around the edge of the circle **at an equal distance from each other**. Now ask them to draw lines between each group of shoe sizes and use the chalk to design a pattern for the sector which they have created, marking a key clearly on or outside the circle.
  
3. Ask questions such as, Which shoe size is the mode? How do we know? What is the range of shoe sizes in this group?

### Activity 2: Sticky data

**Resources needed:** Sticky notes, (one set for each group of 4) and a board or other place to display them. If sticky notes are not available, you could do the activity on the floor with identical squares of paper. **Organisation:** whole group

Pose a question for the class to answer, for example, 'How could we show how many boys and girls are there in our class?' 'What is your favourite colour?' List some of the questions on the board.

Ask another question, for example, "In which month were you born?". Each learner has a sticky note and writes their name on it.



How could we use the sticky notes to answer the same questions? Give learners time to have a think themselves, then talk to a partner, then share with the whole group (think - pair - share).

Ideas may include pictograms, bar graphs, Venn diagrams etc.

Draw two axes on the board. The group place their sticky notes to answer the question 'How many boys and girls are there in our class?'

Label the 2 axes, the horizontal one with **boys and girls**, the vertical one with numbers.

The group now suggest other questions they could answer using the sticky notes, and make a group display for each.

Talk about which are the easier and why. Which are more problematic, and why?

### **Notes to help you do Activity 2.**

Although other representations will be suggested, the main focus of this activity is to explore the one-to-one representations of bar graphs. Using sticky notes which are all the same size is a good introduction.

It is easier to display qualitative data (such as male/female, spectacles or not, birthday months) as opposed to quantitative data (such as number of siblings, number of pets, height). This is because when showing quantitative data, labelling the axes can be more tricky. This might be the case particularly with continuous data (those that use a scale, such as height) rather than discrete data (such as number of pets).

When introducing pictographs or bar charts to learners it is important to know the difference between quantitative and qualitative data and offer simple examples to begin with.

In the discussion about which were the most difficult questions to display these issues should arise.

## Changes in my classroom

### Implementing the Teaching Strategy

Encourage learners to share ideas, to help each other and to:

- Use memorable experiences
- Own their data
- See where their data fits.

### Key Questions to develop understanding

- How do you know if you have measured the data properly?
- How can you be sure that you are standing in the right sector of the human pie graph?
- Who would want to collect and use data of this sort?
- How might data of this sort be used in the real world, for example by shopkeepers, advertisers or politicians.

### Errors and Misconceptions

Practical activities that involve measuring real objects will usually expose learners' difficulties in using the correct units of measurement accurately. By sharing the group's measurements as in these activities, you can create a supportive environment to discuss any issues, such as: 'Are 22 cm and 220 mm the same? How do you know?'

### Formative Assessment

The use of People Maths activities in this way enables teachers to assess learners who either need support or who are working confidently.

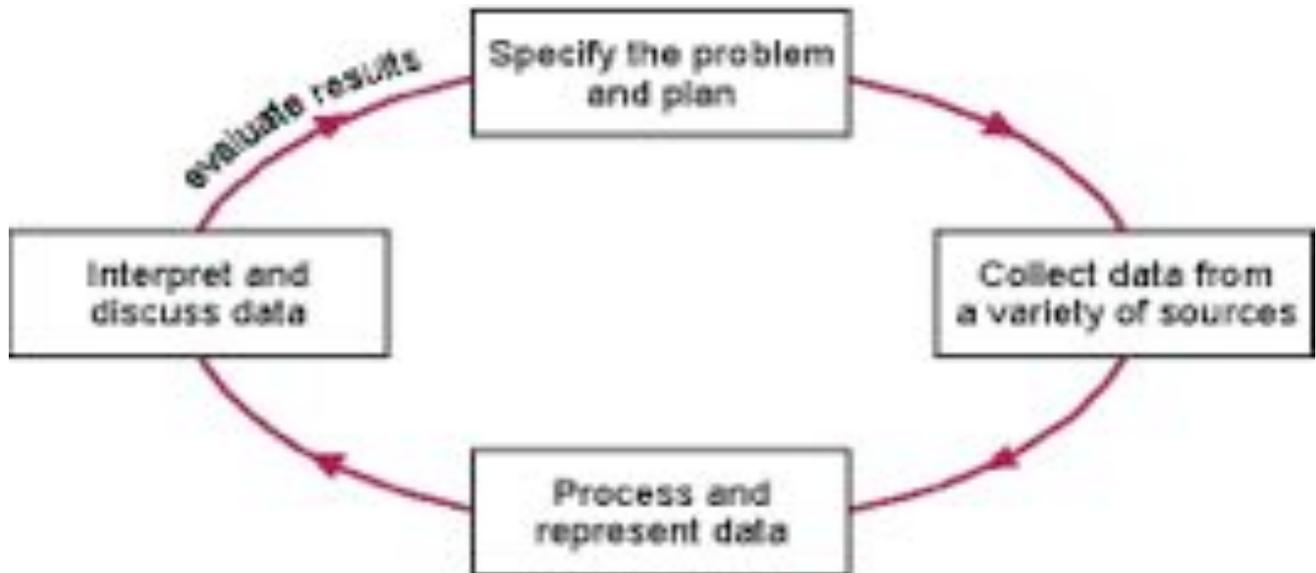
### Helping learners remember

Ask/enable the learners to make a large version (or several, working in smaller groups) of the pie graph for the classroom wall or corridor.

### Follow up activities

Use the cards with shoe sizes written on them to construct bar charts; Ask learners to stand with their cards in order of shoe size to stimulate discussion: What is the mean/mode average size? What do you notice if one member of the group has a particularly large or small shoe size?

## Data cycle



### Data collection strips

Name	Shoe size	Foot length (cm)	Height (cm)	Eye colour	Number of people in household	Way of getting to school	Distance to school (km)	Journey time to school (minutes)

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